Fishery Management Report No. 08-47

Kodiak Management Area Herring Fisheries Annual Management Report, 2006

by

Geoff Spalinger

October 2008

Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Measures (fisheries)

fork length	FL
mideye to fork	MEF
mideye to tail fork	METF
standard length	SL
total length	TL

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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The Fishery Management Reports series was established in 1989 by the Division of Sport Fish for the publication of an overview of management activities and goals in a specific geographic area, and became a joint divisional series in 2004 with the Division of Commercial Fisheries. Fishery Management Reports are intended for fishery and other technical professionals, as well as lay persons. Fishery Management Reports are available through the Alaska State Library and on the Internet: http://www.sf.adfg.state.ak.us/statewide/divreports/html/intersearch.cfm. This publication has undergone regional peer review.

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ABSTRACT

The Kodiak Management Area (KMA) 2006 commercial Pacific herring *Clupea pallasi* sac roe fishery extended from April 15 through June 30. Fishermen harvested 2,643 tons, compared to the preseason guideline harvest level (GHL) of 3,705 tons. A total of 46 sections were open to fishing and harvests occurred within 14 sections. The herring sac roe fishery is managed under an allocative harvest strategy that provides approximately 75% of the total Kodiak GHL to seine gear and approximately 25% to gillnet gear. Purse seine fishermen accounted for 99% of the total catch at 2,617 tons and gillnet fishermen harvested 26 tons (1%). Roe recovery percentages averaged 11.1% for seine harvest and 10.8% for gillnet harvest. The total exvessel value of the fishery was an estimated $726,825. Age-5 (31%), age-7 (15%), age-4 (13%), and age-6 (12%) herring were the dominant age classes harvested, representing an estimated 71% of the harvest.

The KMA herring food/bait fishery was designated a limited entry fishery in 2001 with 5 purse seine and 4 trawl permits issued. A combine fishery has been conducted for the 2001-2006 seasons due to the small GHLs. Only one permit holder has been allowed to fish for the combine. There was no allocation of Lower Cook Inlet, Kamishak Bay stock herring allowed in the Shelikof Strait fishery due to concerns for the low stock status and young age classes of Kamishak herring. ADF&G opened that portion of the Uganik District south of the latitude of Miners Point on September 26 and fishermen made two trips harvesting 169 tons (159 ton GHL). This district was closed on December 8, 2006. The Eastside District (98 ton GHL), the Uyak District (40 ton GHL), and the Alitak District (45 ton GHL) were also opened during the 2006/2007 season; however, no fish were harvested from those districts.

Herring subsistence harvests were reported from a total of 30 subsistence permits. The total subsistence herring harvest for the KMA in 2006 was 4,535 pounds.

Key words: Kodiak, herring, *Clupea pallasi*, sac roe commercial fishery, food and bait commercial fishery, subsistence fishery, stock status, GHL, KMA, Kodiak Management Area, FMR, AMR.

INTRODUCTION

This report presents information concerning the commercial Pacific herring *Clupea pallasi* sac roe, food and bait, and subsistence fisheries that occurred in the Kodiak Management Area (KMA) in 2006. This includes a regulatory history, historical harvest data by fishery, age and weight data collected from the commercial harvest, stock status, and a summary of fishery management activity.

The KMA comprises the entire Kodiak Archipelago and that portion of the Alaska Peninsula that extends from Cape Douglas southwest to Kilokak Rocks. The archipelago is approximately 250 kilometers (150 miles) long, extending from Shuyak Island south to the Trinity Islands. The Alaska Peninsula portion of the KMA is about 267 kilometers (160 miles) long and is separated from the archipelago by Shelikof Strait (Figure 1).

The KMA is divided into 13 districts which define geographical areas used in managing both the herring sac roe and food and bait fisheries (Figure 2). For the sac roe fishery, each district is divided into sections that define the spawning area used by herring stocks or a geographical area.

HERRING SAC ROE FISHERY

HISTORICAL PERSPECTIVE (1964 TO 2006)

The commercial herring sac roe fishery began in Kodiak in 1964 (Figure 3). From 1964 through 2006 herring sac roe harvests averaged 1,998 tons (Table 1). Prior to 1974, the sac roe fishery was unregulated with regard to harvest quotas, gear types, seasons, and fishing periods. Annual harvests, effort levels, herring abundance, prices, and processor interest, fluctuated greatly between 1964 and 1977. Improved market conditions in 1978 prompted increased effort in this fishery with 29 purse seine and 11 gillnet permit holders participating (Manthey et al. 1978).

Between 1977 and 1982 the regulatory and management strategy went through a rapid development phase (Manthey et al. 1982). It was during this period that spotter aircraft and tenders were incorporated into the fishery. Regulatory changes focused on gear efficiency, gear conflicts between seine and gillnet fishermen, and gear restrictions (exclusive registration and limited entry).

In the 1990s, closures of the Prince William Sound and Kamishak Bay herring sac roe fisheries and increases in the Kodiak herring stocks resulted in increases in seine effort in the Kodiak fishery. Many of the inactive Kodiak seine permits were purchased by "circuit seiners" (herring fishermen who participate in all of Alaska's major herring fisheries from Sitka Sound to Bristol Bay). These circuit seiners had experienced crews and were equipped with high quality sonar electronics, nets, and vessels. With the addition of the circuit seiners to the already efficient local Kodiak seine fleet, effort levels grew with 73 permit holders making landings in 1995 (Table 2). The increased seine effort made controlling harvests difficult. Regulatory changes involved several seine depth reductions and shorter seine fishing periods, to reduce harvest rates. Herring prices dropped from a record high of $2,000 per ton in 1996 to $500 per ton the following year, and prices have remained low since (Table 2). With the sharp decline in prices, effort levels also dropped and gillnet gear accounted for a diminishing percent of the total harvest in the late 1990s. In 2000, an allocative harvest strategy, including separate gear areas and harvest opportunity allocations, was established in regulation (5 AAC 27.535(e)).

Season Dates

From 1974 through 1978 the season extended from March 1 through June 30 (Manthey 1979). From 1979 through 1981 it was reduced to May 1 through June 30 (Manthey et al. 1979; Manthey et al. 1982). In 1982 the season opening date was changed to April 15 (Manthey et al. 1982). The April 15 to June 30 season dates remain in effect (5 AAC 27.510(a)).

Fishing Periods

Fishing periods from 1964 through 1978, for both gear types, were 24 hours per day, seven days per week (Manthey 1979). In 1979 and 1980, the fishing periods were 48-hour openings followed by 24-hour closures (Manthey et al. 1980). In 1981, the fishing periods were further reduced to 24-hour openings followed by 24-hour closures (NOON on odd-numbered days of the month to NOON on even-numbered days of the month), which remained in effect through 1994. In 1995, fishing periods were reduced by emergency order (EO) to 10 hour openings from April 21 to May 2 to reduce harvest rates.

Since 1996, gillnet fishing periods were separated from the seine periods and were again set at 24-hour openings followed by 24-hour closures for the duration of the season.

From 1996 through 1999, fishing periods for purse seiners were limited to 13 hours in duration from April 15 through May 4. Beginning on May 5 fishing periods were 24 hours in duration followed by 24-hour closures for the remainder of the season (Gretsch 2001). In 2000 through 2004, fishing periods in most sections were 12 hours in duration from April 15 through May 7 and 13 hours in duration from May 8 through June 30, with 24-hour closures between periods (Gretsch 2005). In 2002 through 2004, the department used EO authority to reduce fishing period duration in sections that had high effort levels and a large available biomass in order to control harvests (Gretsch 2005). In 2005, Alaska Board of Fisheries (BOF) regulation changes confirmed the EO style of managing certain sections in regulation (5 AAC 27.510(a)).

Gear

Purse seine gear was unrestricted in this fishery through 1973. In 1974, seine gear was limited to 150 fathoms in length and 1,000 meshes in depth. In 1979, gillnet lengths were first limited to a maximum of 300 fathoms with no depth restriction. In 1981, the maximum lengths were reduced to 150 fathoms for gillnets and 100 fathoms for purse seines; these regulations remained in effect through 1995. Also in 1981, trawls and beach seines were eliminated as legal gear for the sac roe fishery. In 1996, purse seine depths were restricted to a maximum of 20 fathoms and gillnet depths were restricted to 230 meshes. In 2000 the seine depth was reduced to a maximum of 18 fathoms stretch measure (5 AAC 27.525 (a)). The 100 fathom length and 18 fathom depth remain in effect for purse seines. For gillnets the 150 fathom length with no depth restriction is in effect.

Gear Levels

Beginning in 1979, combined gear levels increased substantially, reaching a high of 201 units (92 seine and 109 gillnet) in 1980 and 193 units (79 seine and 114 gillnet) in 1981 (Table 2; Figure 4). With the implementation of limited entry following the 1981 sac roe season, entry into the fishery was restricted to past participants until permanent transferable permits could be awarded. From 1982 through 1993 gear levels were relatively constant with 27 to 45 seine permit holders and 62 to 86 gillnet permit holders participating. With an increase in herring abundance and prices, as well as the closure of the Prince William Sound herring fishery, seine gear participation increased abruptly during the 1994 through 1997 seasons, with 73 purse seine permit holders fishing in 1995. The escalation in seine gear participation resulted in increased competition among seiners and between seiners and gillnetters. In 1997 and 1998, herring prices declined and seine participation fell over 50%. Gillnet gear participation took an even sharper drop, with 59 permit holders fishing in 1997, but only an average of 10 gillnet permit holders have participated annually from 2002 to 2006 (Table 2).

Guideline Harvest Levels

From 1974 through 1978, there was an area-wide harvest quota of 3,400 tons. From 1979 through 1984, the area-wide harvest quota was reduced to 2,400 tons (Table 2) and guideline harvest levels (GHLs) were established for four large geographical areas. Descriptions of districts and sections were established in regulation in 1981, with 7 districts and 46 sections identified that year. Starting in 1985, GHLs were established by section on an annual basis and were based on stock status trends. From 1985 through 2001, the combined annual GHLs of all sections ranged from a high of 4,550 tons in 1994 to a low of 1,495 tons in 1999 (Table 2). From 1999 through 2002, GHLs for the fishery were at low levels based on more conservative management and, for some sections, declines in herring abundance. Starting in 2003, the stock status for most districts improved and GHLs were raised each year through 2006 (Table 2).

Harvest Strategy

Overall, the regulatory effect of the developmental phase of the fishery (1977 to 1982) was the emergence of a relatively stable herring sac roe fishery through 1991. Two strong year classes, from the 1987 and 1988 brood years, resulted in a dramatic biomass increase of some stocks and record to near-record harvests in the 1992 through 1995 (Table 2). The increase in herring abundance and high prices resulted in an increase in fishery participation. With the decrease in prices, followed by herring stock declines, gillnet permit holders had little harvest opportunity when competing against purse seine permit holders and they promoted a change in fishery management.

An allocative harvest strategy was developed through the efforts of the BOF Herring Task Force (established in 1999) that consisted of purse seine and gillnet permit holders, and the Alaska Department of Fish and Game (ADF&G) staff. The task force developed a harvest strategy that provided opportunity for gillnet permit holders to harvest approximately 25% and purse seine permit holders to harvest approximately 75% of the total preseason GHL for the management area (5 AAC 27.535(e)).

The harvest strategy required the department to establish GHLs by section, based on historical harvest data, current and past fishery performance, commercial catch samples, and aerial biomass surveys. The department is then required, for each district that has more than one section open to fishing, to assign, by section, 20% to 30% of the GHL to gillnet permit holders and 70% to 80% of the GHL to purse seine permit holders (5 AAC 27.535(e)(2)(D)). This is accomplished by designating one gear type for each section with a GHL.

During the 2002 BOF meeting, a change was made for allocation purposes that combined the three Afognak Districts, treating them as one (5 AAC 27.535(e)(2)(c)(ii)).

During the 2005 BOF meeting several changes were made to the allocative harvest strategy. One allowed the department to combine adjacent sections within a district and manage them as a single unit when information indicates that one stock of herring is being harvested. The plan was also changed so that purse seine and gillnet gear may be allowed to fish the same section in order to achieve the allocation percentages within a district. Changes also directed the department to manage the fishery to strive for the highest level of product quality; previous regulations directed fishery management with out regard for herring roe quality. Lastly, a conservation provision concerning section harvest overages being applied to a district GHL was eliminated from the plan.

FISHERY MANAGEMENT

GHL Criteria

Preseason GHLs are established for all sections that have produced consistent herring harvests in previous seasons. These GHLs reflect the status of a particular herring stock by section. In 2006, section GHLs ranged from 10 to 1,500 tons. Criteria for establishing the 2006 GHLs involved evaluation of a variety of information to determine stock status trends and conservative adjustment of GHLs, including: 1) fishery performance during the preceding season or seasons (i.e., harvest timing, harvest duration, average school size); 2) trends in age composition (i.e., level of recruitment of age-3 herring, the proportion of age-5 and younger herring, and the proportion of age-2 herring as an indicator of future recruit strength); 3) observations of spawn and juvenile herring; 4) industry and department aerial surveys; 5) hydroacoustic surveys; 6) test fishery data including age composition and biomass estimates; and 7) aged-structured analysis (ASA) modeling. Preseason GHLs have generally reflected the actual harvests (Figure 5) and have aided fishermen and processors in planning prior to the start of each season.

Fishery Characteristics

The KMA herring sac roe fishery currently occurs in approximately 30 bays and coastal locations (Figure 2). The fishery opens at NOON on April 15, with the majority of the management area opening concurrently. Historically, the concurrent opening of sections on April 15, prior to any major buildup of herring, was intended to distribute effort and harvest; however, during the last 7 years, purse seine fishermen have concentrated in areas known to have early spawning herring and the largest GHLs. With the allocation plan in effect since 2000, the department has used emergency

orders to adjust fishing time and the portion of a section opened if overharvest concerns exist. Several sections that are known to have later spawning and larger stocks were also opened at a later date, when the department was available to monitor the fishery.

The ADF&G has historically relied on the fishing industry to establish roe recovery and minimum size standards. The quality of Kodiak herring has been generally high, due to careful selective harvest of mature herring by fishermen and the inseason processing of relatively small amounts of herring over long time periods by local processors. In the 1990s, competition in the purse seine fishery intensified and fishermen were less selective in harvesting high quality herring. In 2003 and 2004, the department took a more active role in some sections to manage for roe quality, which resulted in delayed openings of sections and an increase in roe quality. During the 2005 BOF meeting, the harvest strategy was changed so that the department is now directed to strive for the highest level of product quality (5 AAC 27.535(e)(6)).

Inseason Fishery Management

Processors and independent tender operators are required to provide daily tallies of herring deliveries by section, as well as accurate estimates of herring onboard tenders that have not yet delivered to the processor. The department tallies reports from field personnel, processors, and tenders, to assess herring harvests. Generally, once the harvest estimate meets or approaches the GHL, a section is closed for the season by emergency order. Due to the rapid pace at which some harvests occur, inperiod closures are frequent. In sections that have field personnel present on the grounds, inperiod closures may occur with only a few minutes of advance notice.

Timely and accurate harvest reports from department field personnel, permit holders, spotter pilots, and processors are critical for assessing herring harvests and managing the fishery. To date, industry cooperation has greatly aided managers.

2006 SEASON SUMMARY

The 2006 sac roe season opened at NOON April 15, and 24 emergency orders concerning this fishery were issued during the season (Appendix A1). The last harvest occurred on May 18 (Figure 6). The total 2006 KMA GHL was 3,705 tons (Tables 2 and 3; Gretsch et al. 2006) and the total harvest was 2,643 tons (Table 2; Figure 5).

In 2006, 21 purse seine permit holders made 86 landings during the season harvesting 2,617 tons while, gillnet permit holders harvested 26 tons (Table 2). Purse seine permit holders harvested 99% and gillnet fishermen 1% of the total KMA harvest (Table 2; Figure 7). The average purse seine permit holder harvested 125 tons, the highest average harvest in the past 28 years (Table 2). A total of seven tenders were registered to transport herring to processors. There were three companies operating four shore-based processing facilities that were registered to buy and process herring.

The 2006 fishery was monitored by two ADF&G shore-based field crews and two department vessels, which were stationed in anticipated herring harvest locations. Crews gathered effort and harvest data used to manage the fishery, and collected commercial catch samples to obtain age, weight, and length (AWL) data.

There were a total of 46 sections open to fishing; however, 15 sections were exploratory and have little or no historic harvests (Table 3). Harvests occurred within 14 sections, 31 sections

were not fished, and the remaining section was fished with no harvest. Many of the sections that were not fished were within the Mainland Districts.

Purse Seine Fishery

With record low prices in 2006, participating seine permit holders chose to form a combine where a few select permit holders were able to fish for all permit holders. Fisheries were not affected by this combine; however, it did allow on-the-grounds managers to fish on large concentrated biomasses by allowing only one set at a time. Normally managers would have kept the fleet off of large herring concentrations to prevent overharvest. This combine allowed fishermen to test catches from each set to ensure high quality herring were being harvested. The majority of the departments efforts were spent on managing the purse seine fishery due to the harvest power of the purse seine fleet versus the smaller less efficient gillnet fleet. The season opened on April 15, but bad weather forced the combine to wait until April 17 to begin fishing.

In 2006, purse seine effort was concentrated in similar areas as previous years. The Village Islands/Uganik Bay sections of the Uganik District had a GHL of 1,200 tons and 1,222 tons were harvested (Table 3). In the Inner Uyak Section of the Uyak District, 223 tons were harvested from a 300 ton GHL (Table 3). The Eastside District had a combined harvest of 688 tons from the East Sitkalidak, West Sitkalidak, Barling Bay, Inner Ugak Bay, Outer Kiliuda Bay, and Kaiugnak sections where the GHLs totaled 750 tons (Table 3). The Outer Deadman Bay, Inner Deadman Bay, North Olga Bay, and Upper Olga Bay sections in the Alitak District had a combined harvest of 216 tons out of a total GHL of 325 tons (Table 3). The Danger Bay Section of the South Afognak District had a 181 ton harvest from a 90 ton GHL (Table 3). The Kizhuyak Bay Section of the Inner Marmot District had a harvest of 87 tons from a 60 ton GHL (Table 3). Roe recovery from purse seiners, for all areas, averaged 11.1% (Figure 8).

Gillnet Fishery

All sections that were designated for the gillnet fishery opened on April 15, except the Village Islands/Uganik Bay sections. These combined sections were a designated EO fishery where both gear types would be allowed to fish.

In the Uganik District, for the combined Village Islands\Uganik Bay sections there was a 300 ton GHL for gillnet gear and 26 tons were harvested (Table 3). Gillnet roe recovery averaged 10.8% in 2006 (Figure 8).

Exvessel Value of the Fishery

The price paid for herring with 10% roe recovery was approximately $275 per ton, at the dock (Table 2). Roe recovery for the 2006 fishery averaged 11.1%. The estimated average exvessel earnings for purse seine permit holders was $34,270 (Table 2; Figure 9). The total exvessel value of the 2006 fishery was an estimated $726,825 (Table 2; Figure 10), which does not include any adjustments in value for roe recovery above or below 10% recovery, herring that are sold as bait, or herring that were discarded.

CATCH SAMPLING

A total of 4,113 herring were collected for age, weight, and length (AWL) analysis from harvests, representing twelve of the fourteen sections that had a harvest in 2006 (Table 4). These twelve sections accounted for 99% of the total KMA harvest. Age-5 herring were the dominant age class harvested in the 2006 season, representing an estimated 31.3% of the total purse seine

harvest (Table 4). The remaining age classes represented the following percentage of the harvest: 10.4 % age-3, 12.7% age-4, 12.0% age-6, 15.1% age-7, 4.3% age-8, 6.9% age-9, 1.3% age-10, 1.5% age-11, 2.4% age-12, 1.2% age-13, 0.1% and age-14+ (Table 4). All herring sampled were collected from purse seine harvests. Generally, herring from Alitak and the eastside of Kodiak Island were larger at age than those found on the west side of Kodiak (Table 5).

STOCK ASSESSMENT

ADF&G evaluates fishery performance and survey information to assess trends in stock status. Hydroacoustic and aerial surveys conducted by the department are utilized to assess herring abundance prior to, during, and after the commercial fishery, and to survey closed sections. ADF&G research vessels are also used to collect herring samples by trawl, gillnet, and jig gear. Age composition information from these samples provides insight into recruitment trends and guides the department when adjusting GHLs. For example, areas with strong percentages of age-4 and younger herring (recruitment) will not be aggressively fished and will have conservative GHLs, while areas with older age classes (9 or more years old) will be more aggressively fished with increased GHLs.

Industry aerial observers and permit holders have aided managers by providing biomass estimates, spawn observations, fleet movements, and harvest estimates. Commercial herring pilots are very experienced and have been involved for several seasons in the KMA and other statewide herring fisheries. The department has also received assistance from air charter pilots with herring and spawn observations.

The results of aerial and hydroacoustic assessments can provide a limited evaluation of the total biomass. Problems associated with herring assessment in the KMA include: 1) herring tend to be near the surface, and hence more visible, during the evening and early morning hours, limiting the time fish are observable from the air; 2) most fishing sections have several distinct schools of herring that spawn from April through June; 3) herring may stay within an area for the duration of the sac roe season or may move to another district, which may lead to duplicated or incomplete biomass estimates, or incorrect assignment to a spawning stock location; 4) the KMA encompasses a large geographical area; 5) adverse weather conditions; and 6) hydroacoustic surveys are limited in shallower waters, and the extent of herring avoidance to vessel noise is unknown. There also appears to be a significant amount of subtidal spawning, occurring in water 10 to 20 fathoms in depth, which is not detectable from aerial surveys.

Due to the low gillnet effort since 1998, it is difficult to use fishery performance as an indicator of stock status within the sections allocated to gillnet gear.

STOCK STATUS BY DISTRICT

The following is a review of stock status as indicated by recent fishery performance, age composition data, recruitment trends, and survey data by district. Herring can generally be found seasonally in all bays of the KMA (Figure 2). ADF&G currently monitors approximately 70 sections that are known to have spawning populations of herring. The majority of the department's assessment efforts target larger herring stocks. Generally, there is less information available for the smaller stocks of herring so the evaluation of these stocks is more tenuous. In some cases, such as sections of the Mainland District, several years may elapse before new information becomes available. The department also considers information provided by commercial herring fishermen and pilots, air taxi operators, and remote area residents, concerning herring distribution, biomass estimates, and spawn sightings, when determining stock status.

West Afognak District

There are six sections in the West Afognak District, and five have spawning stocks of herring. Paramanof Bay has the largest spawning stock within this district, though this stock is currently at low levels. The Paramanof Bay fishery was closed in 2006 as the observed biomass in 2005 was assessed to be from 300-500 tons. In 2006, the R/V Resolution conducted hydroacoustic surveys in late April. The observed biomass was less than 300 tons. The department staff onboard was able to trawl some herring and the samples consisted of juvenile age-1 herring.

The Raspberry Strait Section (WA10) has been closed since 2002. Spring hydroacoustic surveys in 2006 were encouraging and indicated around 200 tons present in this section.

South Afognak District

The South Afognak District comprises six sections. In 2006, the Danger Bay Section was open to purse seine fishing only. A 90 ton GHL was established and approximately 181 tons were harvested (Table 3). Age compositions from the commercial catch samples showed the fishery consisted of 30.3% age-5, 16.8% age-6, 16.5% age-3, 14.3% age-7, 10.4% age-4, 5.2% age-8, and 4.1% age-9 herring (Table 4). Post fishery hydroacoustic surveys indicated a large biomass was present in this section.

In 2006, the MacDonalds Lagoon, Kitoi Bay, and Izhut Bay sections were combined and managed as one gillnet section with a 40 ton GHL (Table 3). No herring were harvested; however, the department conducted a hydroacoustic survey in mid-April and one school estimated to be 500 tons was observed.

Uganik District

The Uganik District consists of nine sections on the northwest side of Kodiak Island. During the last 10 years, this district has been the most productive in the KMA. Hydroacoustic and aerial survey information indicate that the Village Islands spawning biomass is currently the largest in the KMA. In 2006, the total biomass of herring observed in the Village Islands/Uganik Bays sections was estimated to be from 10,000 to 30,000 tons (herring congregate in Uganik Bay for a month or longer, complicating biomass estimation). The 2006 GHL for this section was a record 1,500 tons (1,200 ton for purse seine and 300 ton for gillnet), and approximately 1,222 tons were harvested by purse seine gear (Table 3). Age composition data from the 2006 Village Islands/Uganik Bay sections commercial sac roe purse seine fishery showed that the fishery consisted of 23.3% age-7, 18.7% age-4, 14.2% age-6, 13.7% age-3, 12.6% age-5, 8.7% age-9, and 5.4% age-8 herring (Table 4). A bait herring fishery that occurred in September and December, 2006, in Northeast Arm was also sampled and consisted of 12.2% age-3, 31.1% age-4, 26.6% age-5, 20.0% age-6, 6.6% age-7, 2.2% age-8, and 1.1% age-9 herring. The age composition of the bait fishery sample would indicate recruitment may be strong for the Village Islands Section in 2007.

Uyak District

Through the 1980s, the Uyak District was the largest herring producing district in the KMA. In 2006, the GHL was 300 tons and 223 tons were harvested within the Inner Uyak Bay Section (Table 3). Commercial catch samples were 24.6% age-7, 19.7% age-9, 12.1% age-3, 11.3% age-5, 10.9% age-8, 9.8% age-6, and 9.4% age-4 herring (Table 4). Hydroacoustic and aerial surveys indicate

approximately 3,000 tons present in this section. Small spawn observations were reported by industry spotter pilots in 2006.

In 2006, the gillnet GHL for the Zachar Bay Section was increased to 40 tons and no harvest occurred (Table 3). A hydroacoustic survey done in late April indicated an observed biomass of approximately 500 tons. However, it is likely that these herring spawn in adjacent bays and sections.

In 2006, the Spiridon Bay Section was opened with a 10 ton gillnet GHL; however, no harvest occurred (Table 3). Hyroaccoustic surveys in April of 2006 indicated approximately 200 tons present.

The Browns Lagoon Section was opened in 2006 to gillnet with a 50 ton GHL (Table 3). No harvest was made and department surveys indicated approximately 500 tons present.

Inner Marmot District

There are five sections within the Inner Marmot District. All sections have known spawning stocks of herring though most are small. The Kizhuyak Bay Section has the largest stock of herring in the district. In 2006, this section was opened to purse seine gear with a 60 ton GHL and 87 tons were harvested (Table 3). Age classes from the harvest were 41.9% age-5, 20.9% age-6, 18.0% age-7, and 9.5% age-3 herring (Table 4).

Eastside District

Four bay complexes compose the Eastside District: Ugak Bay, Kiliuda Bay, East Sitkalidak Strait, and West Sitkalidak Strait. Sixteen sections have been established for the Eastside District and only one, the Outer Sitkalidak Section, has no history of herring sac roe harvests. Due to the reduced gillnet fleet and low herring prices, the smaller and more distant gillnet sections of this district have not been fished in recent years. Hydroacoustic surveys in this district are less frequent than other portions of the KMA.

Generally, the East and West Sitkalidak sections have the earliest spawning herring in the KMA, with initial spawns occurring in late March. In 2006, the purse seine GHL for the East Sitkalidak Section was increased to 150 tons and 225 tons were harvested (Table 3). Age compositions from the harvest were dominated by age-5 (78.3%) herring, other age classes included age-6 (6.9%) and age-4 (5.6%; Table 4).

The West Sitkalidak Section purse seine GHL was established at 125 tons in 2006; however, only 10 tons were harvested from this section and no catch samples were obtained (Table 3). This poor performance is likely due to low effort rather than stock strength.

The Barling Bay Section, adjacent to the West Sitkalidak Section, has been the most consistent herring producer in the Eastside District. In 2006, 57 tons were harvested from the 75 ton purse seine GHL (Table 3). Commercial catch samples were dominated by age-5 (78.4%) herring (Table 4). Recruitment did not appear to be strong with age-3 herring representing less than 1% of the harvest.

The Inner Kiliuda Bay and Outer Kiliuda Bay Sections have been consistent and strong herring producers during the last 10 years. For the 2006 season, the department assigned the Inner Kiluida Bay Section to gillnet gear and the Outer Kiluida Bay Section to purse seine gear. This management action gave both gear types an opportunity to harvest herring from this strong stock. In 2006, the Outer Kiliuda Bay Section had a GHL of 200 tons and 202 tons were harvested (Table 3). Commercial catch samples showed that age-5 (73.5%) was the strong age class followed by age-4

(5.3%, Table 4). In 2006, the GHL for the Inner Kiliuda Bay Section was set at 75 tons and there was no harvest (Table 3).

The Inner and Outer Ugak Bay sections have been strong herring producers in the past. The 2006 gillnet GHL for the Outer Ugak Bay Section was 120 tons; however, this section was not fished (Table 3). For the Inner Ugak Bay Section, the purse seine GHL was 200 tons and 185 tons were harvested (Table 3). Age compositions from the harvest were 28.5% age-12, 20.1% age-6, 13.7% age-13, and 11.6% age-11 herring (Table 4).

Alitak District

In 2006, several sections in the Alitak District were modified and one was eliminated in order to clarify section lines (Figure 11). All sections but the Outer Alitak Section are known to have a stock of herring.

In 2006, the purse seine GHL for the Inner Deadman Bay Section was set at 75 tons and 27 tons were harvested (Table 3). Age classes from this harvest were dominated by age-5 (78.3%; Table 4) herring. The Outer Deadman Bay Section was also open to purse seine gear in 2006 with a 75 ton GHL and 79 tons were harvested (Table 3). Age compositions from the catch samples show the harvest to be composed mostly of age-5 (66.5%; Table 4). Recruitment was strong for this section with age-3 herring representing 16.2% (Table 4) of the harvest. In 2006, the North Olga Bay Section was modified and a 50 ton GHL was established for purse seine gear (Table 3). A total of 48 tons were harvested and age-5 (82.9%) herring composed the majority of the harvest (Table 4). In 2006, the Upper Olga Bay Section was also slightly modified and a 50 ton GHL was established for purse seine gear; 63 tons of herring were harvested with age-5 fish representing 85.7% of the harvest (Table 4).

Northeast District

The Northeast District is composed of five sections and four have known spawning stocks of herring (Figure 2). The Women's Bay Section currently has the largest stock of herring in this district. In 2006, a 30 ton GHL was established for gillnet gear; however, no herring were harvested. (Table 3).

Mainland Districts

There are three Mainland districts comprising 12 sections (Figure 2). The last commercial herring harvest from the Mainland Districts occurred in 1997. Seven sections were open as exploratory in 2006; however, no effort occurred (Table 3). No information has been obtained from the Mainland District in recent years.

HERRING FOOD AND BAIT FISHERY

HISTORICAL PERSPECTIVE

The earliest recorded commercial herring food and bait harvest in the KMA occurred in 1912 (Table 6). In the early 1920s, the fishery expanded and large herring were sought for food products, such as salted and pickled herring, which were in high demand after World War I. By the late 1920s, the demand for herring food products had declined and the fishery switched to reduction products, such as fishmeal and oil. During the peak years of the reduction fishery (1934 to 1950) harvests vastly surpassed recent food and bait herring harvests (Figure 12). During the reduction fishery the major harvest areas were located in eastern Shelikof Strait and adjacent bays and straits along the west side of Kodiak and Afognak islands. Quotas and harvest

weights were measured by barrels (250 lbs. of herring equaled one barrel) until 1956 when the unit of measure was changed to tons. Large (approximately 70 foot) "sardine seiner" type vessels were used in conjunction with holding pounds to supply herring to five major reduction plants (Manthey et al. 1978). In addition, small seine and gillnet operators participated in a portion of the food fishery and delivered to floating and shore based salting and pickling operations.

From the early 1960s to 1973 there were no harvest quotas or closed seasons. From 1974 through 1980, an open fishing season was established between July 1 and February 28. In 1979 and 1980, GHLs for the food and bait season were established at 12,600 tons. The season opening date for the fishery changed from July 1 to August 15 for the years 1981 through 1984. As a result of the rapidly developing sac roe fishery, the GHL for the food and bait season was reduced to 1,000 tons in 1981 and remained at that level through 1987. In 1985, the season opening date was moved to August 1. Regulatory GHLs for the herring food and bait fishery were replaced with a regulatory harvest strategy in 1988 that established variable GHLs based on herring stock status. The season opening date was moved to October 1 in 1999 to allow department staff additional time to prepare the Kamishak Bay herring forecast and manage the fishery in the fall. In 2005, the season opening date switched to September 1 to allow for more market opportunities for the herring as bait in the Bering Sea red king crab *Paralithodes camtschaticus* fishery. The herring food and bait season closing date has remained February 28.

Fishing periods through 1996 were unrestricted, 24 hours per day, seven days per week. In 1997, fishing periods were reduced to 12 hours (8:00 AM to 8:00 PM), seven days per week. The restriction of fishing period length was intended to slow harvest rates in order to ensure that GHLs were not greatly exceeded.

Gear used in this fishery includes trawl, seine, and gillnet. Gear was first restricted for the 1986/87 season when seine gear was limited to 100 fathoms in length and 1,025 meshes in depth and gillnet gear was limited to 150 fathoms in length with no depth restrictions. For the 1993/94 season, purse seine specifications were increased to 150 fathoms in length and 1,625 meshes in depth. These changes made seine gear more competitive with trawlers; seine fishermen harvested an average of only 2% of the food and bait harvest from 1987 through 1992 compared to 54% of the total food and bait harvest from 1993 to 1998. There are no restrictions on trawl gear, which is fished mid-water with no bottom contact. All three gear types fished the same areas and were subject to the same fishing periods.

In 2001, this fishery was designated as a limited entry fishery by the Commercial Fisheries Entry Commission (CFEC) and a points system was developed to evaluate past fishery participation and determine who would receive a limited entry permit. In 2002, CFEC issued limited entry permits that included five purse seine/gillnet permits and four trawl permits.

MANAGEMENT PLAN HISTORY

During the fall and winter months of the early 1980s, major concentrations of herring were observed in eastern Shelikof Strait and adjacent bays along the west side of the Kodiak Archipelago. The biomass exceeded that of known KMA spawning stocks. Herring food and bait fishermen targeted these herring, but the stock composition was unknown. In 1986, a stock identification study, based on scale pattern analysis, was conducted on herring harvested from a

large biomass located in the northeastern part of the Shelikof Strait[1]. Results of the study indicated that at least 80% of the Shelikof herring catch sampled were Kamishak Bay stocks, which spawn within the Lower Cook Inlet (LCI) Management Area.

In 1988, the BOF allocated not more than two percent of the previous season's total available Kamishak Bay spawning herring biomass for harvest in the Kodiak herring food and bait fishery. For local Kodiak spawning stocks, which were exploited during the sac roe fishery, the food and bait GHL was to be determined based on 10% of the harvest that occurred in the previous KMA herring sac roe season.

Problems subsequently developed after implementation of this management plan because it was difficult to assign harvest from the intermixed stocks to either Kodiak or Kamishak if the stocks from both areas had similar age compositions. This plan was in effect through the 1992/93 season.

In the fall of 1992, the BOF approved the Kamishak Bay District Herring Management Plan (5 AAC 27.465), which outlined criteria for the management of the Kamishak Bay herring sac roe and the Shelikof Strait herring food and bait fisheries. This plan defined allocations to each fishery based on biomass estimates.

In 1993, the BOF placed into regulation a harvest strategy defining the criteria for managing the Kodiak herring food and bait fishery (5 AAC 27.535). This strategy combines the Kamishak stock GHL with the Kodiak stock GHL for food and bait districts (West Afognak, Uganik, and Uyak districts; Figure 2). This portion of the KMA food and bait fishery is referred to as the Shelikof Strait food and bait herring fishery. The Kamishak allocation to the Shelikof Strait food and bait herring fishery ranges from 1% to 2% of the Kamishak spawning biomass. When the combined GHL is achieved the Shelikof Strait food and bait districts (West Afognak, Uganik, and Uyak) are closed collectively. This harvest strategy alleviates the problem of identifying the spawning stock of a harvest in areas where intermixing may occur. The plan also closes the Kamishak Bay sac roe fishery and the Shelikof Strait food and bait fishery north of the latitude of Miners Point (Uganik Bay) when the Kamishak spawning biomass falls below 8,000 tons (5 AAC 27.535(d), 1993).

In 1999, the BOF made additional changes to the KMA herring food and bait fishery. The season opening date was changed to October 1 so department staff in the LCI management area would have additional time to complete the Kamishak Bay herring forecast and determine the resulting allocation for the Shelikof Strait food and bait fishery. Prior years' fisheries generally occurred based on preliminary Kamishak forecasts, and actual harvests were often either lower or higher than the final Kamishak allocation, which was sometimes completed weeks after the fishery occurred. The harvest strategy was also changed so that GHLs for KMA stocks were based upon 10% of the GHLs established for the preceding KMA sac roe fishery by section. The previous regulation based the food and bait GHL upon 10% of the actual KMA sac roe harvest by section. In cases where an excessive harvest occurred during the sac roe fishery, the related food and bait GHL would also be high. Lastly, changes to the plan clarified and put into regulation the previous practice of limiting a district harvest to no more than the sum of the individual section GHLs it contains. These changes promoted a more conservative approach to managing this fishery.

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[1] Per draft manuscript, 1988, by B. A. Johnson, C. Burkey, and D. Gaudet, entitled *Stock identification of Pacific herring in the bait fishery in Shelikof Strait, Alaska, 1985/86*. Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau Alaska.

In November 2001, the BOF adopted changes to the Kamishak Bay District Herring Management Plan based on the results of a threshold analysis preformed by LCI department staff. The analysis concluded that the minimum spawning biomass threshold should be at least 6,000 tons (5 AAC 27.465(e)(3)), 2,000 tons less than the previous minimum spawning biomass threshold of 8,000 tons. Other changes to the plan included a reduction in the maximum exploitation rate for Kamishak herring, which in turn lowered the allowable exploitation rate of the Shelikof Strait fishery from 2% to 1.5% of the Kamishak spawning biomass. Lastly, a portion of the plan, which required adjustment of Shelikof Strait young age class harvests to reflect the estimated weight of an equal amount of older age class herring, was eliminated.

KAMISHAK FISHERY CLOSURE

The Kamishak Bay District fishery has been closed since 1999 and the population is at low levels (Otis and Cope 2004). The biomass forecast for Kamishak Bay herring for the 2007 season was estimated at approximately 2,286 tons, well below the minimum spawning biomass of 6,000 tons that must be met before commercial fisheries may occur. (Hammarstrom 2006). Additionally, stock assessment surveys determined that approximately 52% of the population consisted of age-5 and younger fish. The Kamishak Bay District Herring Management Plan states that commercial harvests must target older, repeat spawners in order to protect recruit-class herring. Due to the low stock status, the Kamishak Bay sac roe fishery will be closed for the 2007 season and the Shelikof Strait food and bait fishery north of the latitude of Miner's Point was closed for the 2006/2007 season.

FOOD AND BAIT COMBINE FISHERIES 2001 TO 2006

The KMA herring food and bait fishery was closed for the 1999 and 2000 seasons because of low potential GHLs and the department's concern for manageability of a competitive fishery on a highly aggregated stock. In 2001, the CFEC designated the KMA herring food and bait fishery a limited entry fishery and issued 13 interim use permits to those fishermen who made landings between 1994 and 1998 (Gretsch 2003). However, because of the relatively small GHLs available the department again did not allow an open competitive fishery to occur even though the fishery was restricted to the 13 interim permit holders. As an alternative, the interim permit holders formed a combine and the department and CFEC agreed to allow a combine fishery to occur. The 13 interim permit holders determined which vessel would conduct the harvest, all marketing aspects, and all costs associated with harvesting and tendering the herring. In July 2002, the CFEC made a final determination on these limited entry permits. Nine permanent limited entry permits were issued, five were purse seine/gillnet permits and four were trawl permits.

Combine fisheries have been conducted under similar conditions for the 2002 – 2006 seasons. Different purse seine permit holders have participated in the harvesting of the herring for a larger portion of the proceeds, while the trawl permit holders and those purse seine permit holders who are not harvesting receive a check for a lesser portion of the total co-op proceeds. Generally, one tender has been used and two purse seine permit holders have worked together on one purse seine vessel to catch the herring. Fishing efforts have targeted the two larger GHL areas including the Uganik and Eastside Districts while the two smaller GHL areas the Alitak and Uyak Districts have remained unfished. The trawl permit holders have not participated in the harvesting for the combine fishery. The combine fishery on some years has gone smoothly and other years disagreements have occurred when the harvesting permit holders failed to catch the herring or failed to meet market deadlines.

For the 2006/2007 season, the permit holders again requested a combine fishery though there was some discussion of having a competitive fishery. The biggest obstacle to a competitive fishery is how to decide an equitable fishing period for the two gear types. The department agreed with the permit holders request and that portion of the Uganik District south of Miners Point, the Eastside Kodiak District, the Uyak District, and the Alitak District were opened at NOON September 26 with one purse seine vessel and one tender on the grounds. Two EO's were issued for this fishery. Approximately 71 tons were harvested on September 27 of the 159 ton GHL. This harvest provided the bulk of the herring bait needed for the Bering Sea red king crab fleet ported in Kodiak. On December 7, a second trip was made to the Uganik District and 98 tons were harvested. The department issued an EO closing the Uganik District effective at 10:00 AM December 8 and the total harvest was 169 tons. The harvest from the second delivery was used primarily for the Kodiak Tanner crab *Chinoecetes bairdi* fishery that was scheduled to open January 15, 2007. There were approximately 183 tons available for harvest in three other districts that were not fished in the 2006/2007 season.

CATCH SAMPLING

A total of 90 herring were collected for AWL analysis from the fishing periods in the Uganik District by purse seine gear. Age compositions from the sample were 12.2 % age-3, 31.1 % age-4, 26.6% age-5, 20.0 % age-6, 6.6% age-7, 2.2% age-8, 1.1% and age-9.

HERRING SUBSISTENCE FISHERY

FISHERY CHARACTERISTICS

Prior to 1999, the herring subsistence fishery was referred to as a Personal Use/Subsistence Fishery and had occurred for more than twenty years. The majority of the harvest occurred near the Port of Kodiak in Womens Bay and was caught by gillnets. The herring were used primarily for bait in commercial longline and pot fisheries. Prior to 1999, this fishery was only regulated during the herring sac roe season, from April 15 to June 30, under the conditions of the subsistence permit issued in Kodiak. Gear was limited to a 25 fathom gillnet but there was no harvest limit. The remainder of the year there were no permit requirements, gear restrictions, or harvest limits.

In 1999, more restrictive regulations were approved by the BOF. These regulations allowed for a harvest of up to 500 pounds of herring with no permit requirements, except during the sac roe fishing season (April 15 to June 30; Gretsch 2001). A subsistence permit was required for those individuals that wished to fish during the sac roe season or intended to harvest more than 500 pounds of herring annually. The maximum annual harvest was limited to 2,000 pounds per permit. In recent years most of the herring caught for subsistence were used for bait (in sport or commercial fisheries), food, or fertilizer.

In 2000, herring subsistence harvests escalated due to bait needs created with the reopening of the commercial tanner crab fishery in the KMA. The department was concerned about the increased herring subsistence harvest and the appropriateness of taking subsistence herring for use as bait in a commercial fishery. The department submitted proposals for regulation changes to the BOF in 2001, and the BOF changed regulations to allow for both types of historic harvests. The new subsistence regulation allows for the harvest of up to a total of 500 pounds of herring annually and requires that fishermen obtain a permit prior to fishing (5 AAC 01.530. (d)). Herring were included on the existing KMA salmon and crab subsistence permit. Also in 2001, a new regulation (5 AAC

27.545) allows for the harvest of up to 500 pounds of herring by commercial permit holders to be used as bait in commercial fisheries, and requires a permit prior to fishing.

2006 SEASON SUMMARY

Herring subsistence harvests for 2006 totaled 4,535 pounds (Table 7). A total of 30 KMA subsistence permits were returned with herring harvest data, with most of the harvest coming from the Eastside, Northeast, and Inner Marmot districts. In 2006 no commercial permit holders harvested herring to be used as bait in commercial fisheries.

REFERENCES CITED

Gretsch, D. 2001. Kodiak management area annual herring management report, 1999. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K01-28.

Gretsch, D. 2003. Kodiak management area annual herring fisheries management report 2002. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K03-56, Kodiak.

Gretsch, D. 2005. Kodiak management area annual herring fisheries management report, 2004. Alaska Department of Fish and Game, Division of Commercial Fisheries, Fishery Management Report No. 05-17, Kodiak.

Gretsch, D., G. Spalinger, and J. Dinnocenzo. 2006. Kodiak management area herring sac roe fishery harvest strategy, for the 2006 season. Alaska Department of Fish and Game, Fishery Management Report No. 06-18, Anchorage.

Hammarstrom, L. 2006. Commercial Fisheries News Release, 2007 Herring Announcement No. 1, September 8, 2006. Alaska Department of Fish and Game, Division of Commercial Fisheries, Homer.

Manthey, K., L. Malloy, and L. Wright. 1978. Kodiak management area 1978 finfish annual report. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kodiak.

Manthey, K. 1979. 1979 Kodiak area roe herring management plan. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kodiak.

Manthey, K., L. Malloy, and L. Wright. 1979. Kodiak management area 1979 finfish annual report. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kodiak.

Manthey, K., L. Malloy, and L. Wright. 1980. Kodiak management area 1980 finfish annual report. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kodiak.

Manthey, K., D. Prokopowich, and L. Wright. 1982. Kodiak management area 1982 finfish annual report. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kodiak.

Otis, E. O., and J. L. Cope. 2004. Abundance, age, sex, and size statistics for Pacific herring in Lower Cook Inlet, 2000-2003. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2A04-04, Anchorage.

TABLES AND FIGURES

Table 1.–Historical harvest data for the commercial herring sac roe and food and bait fisheries and percent of the total annual herring harvest that occurs by fishery, Kodiak Management Area, 1964 to 2006.

Year	Sac Roe Harvest (Tons)	Food/Bait Harvest (Tons)	Total Herring Harvest (Tons)	Sac Roe Fishery Percent of Total Harvest (%)	Food/Bait Fishery Percent of Total Harvest (%)
1964	568	310	878	65%	35%
1965	657	35	692	95%	5%
1966	2,769	198	2,967	93%	7%
1967	1,662	300	1,962	85%	15%
1968	2,001	15	2,016	99%	1%
1969	1,130	11	1,141	99%	1%
1970	342	8	350	98%	2%
1971	284	44	328	87%	13%
1972	215	50	265	81%	19%
1973	831	178	1,009	82%	18%
1974	868	40	908	96%	4%
1975	8	5	13	62%	38%
1976	5	0	5	100%	0%
1977	338	0	338	100%	0%
1978	904	399	1,303	69%	31%
1979	1,735	125	1,860	93%	7%
1980	2,383	381	2,764	86%	14%
1981	2,065	18	2,083	99%	1%
1982	1,771	326	2,097	84%	16%
1983	2,318	33	2,351	99%	1%
1984	2,163	123	2,286	95%	5%
1985	1,968	102	2,070	95%	5%
1986	1,558	213	1,771	88%	12%
1987	2,146	217	2,363	91%	9%
1988	2,171	340	2,511	86%	14%
1989	2,249	345	2,594	87%	13%
1990	2,347	313	2,660	88%	12%
1991	2,432	215	2,647	92%	8%
1992	4,283	312	4,595	93%	7%
1993	4,929	837	5,766	85%	15%
1994	5,893	677	6,570	90%	10%
1995	4,604	507	5,111	90%	10%
1996	3,386	651	4,037	84%	16%
1997	3,235	756	3,991	81%	19%
1998	2,057	151	2,208	93%	7%
1999	1,651	0	1,651	100%	0%
2000	1,370	0	1,370	100%	0%
2001	1,694	115	1,809	94%	6%
2002	1,677	135	1,812	93%	7%
2003	1,992	199	2,191	91%	9%
2004	3,167	190	3,357	94%	6%
2005	3,463	168	3,631	95%	5%
2006	2,643	169	2,812	94%	6%
Average 1964 to 2006	1,998	214	2,213	90%	10%
10 Year Average 1997 to 2006	2,295	188	2,483	92%	8%
5 Year Average 2002 to 2006	2,588	172	2,761	94%	6%

Table 2.–Herring sac roe fishery summary of season length, guideline harvest level (GHL), harvest data by gear type, percentage of harvest by gear type, number of landings, and estimated exvessel earnings, Kodiak Management Area, 1979-2006.

Year	Season Length (Days)	GHL (Tons)	Total Harvest (Tons)	Harvest by Gear Type		Percent Harvest by Gear Type		Number of Landings by Gear Type		Units of Gear Fished		Average Catch by Gear		Estimated Average Earnings [a]		Price per Ton [a]	Estimated Exvessel Total Value [a]
				Seine (Tons)	Gillnet (Tons)	Seine	Gillnet	Seine	Gillnet	Seine	Gillnet	Seine (Tons)	Gillnet (Tons)	Seine ($)	Gillnet ($)	($)	($)
1979	36	2,400	1,735	1,457	278	84%	16%	-	-	57	125	26	2	$38,342	$3,336	$1,500	$2,602,500
1980	35	2,400	2,383	2,009	374	84%	16%	-	-	92	109	22	3	$15,068	$2,368	$690	$1,644,270
1981	48	2,400	2,065	1,596	469	77%	23%	207	406	79	114	20	4	$14,647	$2,983	$725	$1,497,125
1982	59	2,400	1,771	1,447	324	82%	18%	138	191	45	67	32	5	$17,686	$2,660	$550	$974,050
1983	51	2,400	2,319	1,797	522	77%	23%	164	284	41	64	44	8	$35,063	$6,525	$800	$1,855,200
1984	54	2,400	2,163	1,691	472	78%	22%	138	212	39	69	43	7	$34,687	$5,472	$800	$1,730,400
1985	59	2,000	1,968	1,244	724	63%	37%	118	348	34	81	37	9	$32,929	$8,044	$900	$1,771,200
1986	61	1,690	1,558	1,110	448	71%	29%	132	385	31	71	36	6	$34,016	$5,994	$950	$1,480,100
1987	61	1,640	2,146	1,591	554	74%	26%	122	411	29	62	55	9	$54,862	$8,935	$1,000	$2,146,000
1988	59	2,065	2,171	1,304	867	60%	40%	169	555	33	76	40	11	$51,370	$14,830	$1,300	$2,822,300
1989	76	2,415	2,249	1,513	736	67%	33%	171	627	37	83	41	9	$34,758	$7,537	$850	$1,911,650
1990	75	2,375	2,347	1,644	703	70%	30%	156	544	27	63	61	11	$51,756	$9,485	$850	$1,994,950
1991	83	2,510	2,432	1,697	735	70%	30%	169	587	32	64	53	11	$45,077	$9,762	$850	$2,067,200
1992	77	2,720	4,283	3,260	1,023	76%	24%	185	706	40	74	82	14	$40,750	$6,912	$500	$2,141,500
1993	77	3,525	4,929	4,203	726	85%	15%	237	294	41	86	103	8	$56,382	$4,643	$550	$2,710,950
1994	71	4,550	5,893	4,976	917	84%	16%	285	485	66	57	75	16	$60,315	$12,870	$800	$4,714,400
1995	73	4,480	4,604	3,837	768	83%	17%	280	642	73	71	53	11	$66,858	$13,759	$1,272	$5,856,288
1996	69	4,180	3,386	2,322	1,064	69%	31%	202	890	57	74	41	14	$81,474	$28,757	$2,000	$6,772,000
1997	49	3,435	3,235	2,629	606	81%	19%	183	418	64	59	41	10	$20,539	$5,136	$500	$1,617,500
1998	50	2,030	2,057	1,954	103	95%	5%	110	26	35	7	56	15	$27,914	$7,357	$500	$1,028,500
1999	38	1,495	1,651	1,589	62	96%	4%	94	16	31	5	51	12	$33,984	$8,221	$663	$1,094,613
2000 [b]	37	1,735	1,370	1,290	80	94%	6%	57	23	31	10	42	8	$29,129	$5,600	$700	$959,000
2001	47	1,540	1,694	1,412	282	83%	17%	67	37	33	9	43	31	$21,394	$15,667	$500	$847,000
2002	46	1,860	1,677	1,274	403	76%	24%	37	50	30	14	42	29	$21,233	$14,393	$500	$838,500
2003	42	2,600	1,992	1,738	254	87%	13%	59	45	31	11	56	23	$28,032	$11,545	$500	$996,000
2004	42	2,850	3,167	2,894	273	91%	9%	95	36	27	11	107	25	$53,593	$12,409	$500	$1,583,500
2005	31	3,475	3,463	2,932	531	85%	15%	134	61	32	12	92	44	$45,813	$22,125	$500	$1,731,500
2006	34	3,705	2,643	2,617	26	99%	1%	86	*	21	*	125	*	$34,270	*	$275	$726,825
Average 1979 to 2006	55	2,617	2,620	2,108	512	80%	20%	146	331	42	57	50	13	$38,641	$9,318	$787	$2,075,536
10 Year 1997 to 2006	45	2,473	2,295	2,033	262	89%	11%	92	79	34	15	65	21	$31,590	$10,603	$514	$1,142,294
5 Year 2002 to 2006	42	2,898	2,588	2,291	297	88%	12%	82	48	28	10	84	27	$36,588	$12,809	$455	$1,175,265

[a] Exvessel values are based on dock delivered herring and inseason data.
[b] Beginning in 2000, an allocative harvest strategy was in effect.
* Confidential data.

Table 3.–Herring sac roe fishery guideline harvest level (GHL) and harvest by section, Kodiak Management Area, 2006.

Statistical Area	Management Section	Date Closed [a]	Purse Seine		Gillnet	
			GHL	Harvest	GHL	Harvest
NORTH AFOGNAK DISTRICT						
NA10	Shuyak Island	CLOSED	-	-	-	-
NA20	Delphin Bay	CLOSED	-	-	-	-
NA30	Perenosa Bay	6/30/2006	EXPLORATORY	0	EXPLORATORY	0
NA40	Seal Bay	CLOSED	-	-	-	-
NA50	Tonki Bay	6/30/2006	20	0	CLOSED	0
WEST AFOGNAK DISTRICT						
WA10	Raspberry Strait	CLOSED	-	-	-	-
WA20	Malina Bay	6/30/2006	CLOSED	-	10	0
WA31	Paramanof Bay	CLOSED	-	-	-	-
WA32	Foul Bay	CLOSED	-	-	-	-
WA40	Blue Fox/Devil's Inlet	6/30/2006	EXPLORATORY	0	EXPLORATORY	0
WA50	Offshore W. Afognak	CLOSED	-	-	-	-
SOUTH AFOGNAK DISTRICT						
SA10	Izhut Bay	6/30/2006	Note: Sections SA10, SA20, and SA30 managed as one			
SA20	Kitoi Bay	6/30/2006	section, 40 ton GHL.			
SA30	MacDonalds Lagoon	6/30/2006	CLOSED	-	40	0
SA40	Danger Bay	4/17/2006	90	181	CLOSED	-
SA50	Litnik	CLOSED	-	-	-	-
SA60	Duck Bay	CLOSED	-	-	-	-
AFOGNAK DISTRICTS TOTAL			110	181	50	0
UGANIK DISTRICT						
UG10	Kupreanof	CLOSED	-	-	-	-
UG20	Viekoda	6/30/2006	CLOSED	-	30	0
UG21	Terror Bay	6/30/2006	CLOSED	-	25	0
UG31	West Uganik Passage	6/30/2006	CLOSED	-	40	0
UG30	Village Island	Purse Seine 4/25/2006	1,200	1,222	300	26
UG32	NE Arm Uganik	Gillnet 6/30/2006	Note: Sections UG30, UG32, UG33, and UG 34 were			
UG33	E. Arm Uganik	-	managed as one section and with an allocation by gear type.			
UG34	S. Arm Uganik	-	-	-	-	-
UG40	Offshore Uganik	CLOSED	-	-	-	-
UGANIK DISTRICT TOTAL			1,200	1,222	395	26
UYAK DISTRICT						
UY10	Offshore Uyak	CLOSED	-	-	-	-
UY20	Harvester Island	CLOSED	-	-	-	-
UY30	Inner Uyak	4/22/2006	300	223	CLOSED	-
UY32	Browns Lagoon	6/30/2006	CLOSED	-	50	0
UY31	Larsen Bay	CLOSED	-	-	-	-
UY40	Zachar Bay	6/30/2006	CLOSED	-	40	-
UY50	Spiridon Bay	6/30/2006	-	-	10	-
UYAK DISTRICT TOTAL			300	223	100	0

-continued-

Table 3.–page 2 of 3

Statistical Area	Management Section	Date Closed [a]	Purse Seine GHL	Purse Seine Harvest	Gillnet GHL	Gillnet Harvest
ALITAK DISTRICT						
AL10	Outer Alitak	CLOSED	-	-	-	-
AL20	Inner Alitak	6/30/2006	75	0	CLOSED	-
AL21	Inner Deadman Bay	6/30/2006	75	27	CLOSED	-
AL22	Outer Deadman Bay	5/15/2006	75	79	CLOSED	
AL30	Sulua Bay	6/30/2006	CLOSED	-	75	0
AL40	Lower Olga/Moser	6/30/2006	CLOSED	-	50	-
AL41	North Olga Bay	5/18/2006	50	48	CLOSED	-
AL50	Upper Olga Bay	5/18/2006	50	63	CLOSED	-
AL60	Geese/Twoheaded	6/30/2006	EXPLORATORY	0	EXPLORATORY	0
ALITAK DISTRICT TOTAL			325	216	125	0
STURGEON/HALIBUT DISTRICT						
SH10	Sturgeon/Halibut	CLOSED	CLOSED	-	CLOSED	-
EASTSIDE DISTRICT						
EA10	Kaiugnak	6/30/2006	EXPLORATORY	10	EXPLORATORY	0
EA20	SW. Sitkalidak	6/30/2006	EXPLORATORY	0	EXPLORATORY	0
EA21	Three Saints Bay	6/30/2006	EXPLORATORY	0	EXPLORATORY	0
EA22	Newman Bay	6/30/2006	EXPLORATORY	0	EXPLORATORY	0
EA23	W. Sitkalidak Strait	6/30/2006	125	10	CLOSED	-
EA24	Barling Bay	4/20/2006	75	57	CLOSED	-
EA30	E. Sitkalidak St.	4/21/2006	150	225	CLOSED	-
EA31	Tanginak Anchorage	6/30/2006	EXPLORATORY	0	EXPLORATORY	0
EA40	Outer Sitkalidak	CLOSED	CLOSED	-	CLOSED	-
EA41	Boulder Bay	CLOSED	CLOSED	-	CLOSED	-
EA42	Shearwater Bay	6/30/2006	CLOSED	-	40	0
EA43	Outer Kiliuda Bay	5/5/2006	200	202	CLOSED	-
EA44	Inner Kiluida Bay	6/30/2006	CLOSED	-	75	0
EA50	Outer Ugak Bay	6/30/2006	CLOSED	-	120	0
EA51	Inner Ugak Bay	5/13/2006	200	185	CLOSED	-
EA52	Pasagshak	CLOSED	CLOSED	-	CLOSED	-
EASTSIDE DISTRICT TOTAL			750	688	235	0
NORTHEAST DISTRICT						
NE10	Womens Bay	6/30/2006	CLOSED	-	30	0
NE20	Kalsin Bay	CLOSED	-	-	-	-
NE30	Middle Bay	CLOSED	-	-	-	-
NE40	Inshore Chiniak	CLOSED	-	-	-	-
NE50	Offshore Chiniak	CLOSED	-	-	-	-
NORTHEAST DISTRICT TOTAL			-	-	30	0
INNER MARMOT DISTRICT						
IM10	Monashka Bay	CLOSED	CLOSED	-	CLOSED	-
IM20	Anton Larsen Bay	6/30/2006	CLOSED	-	15	0
IM30	Sharatin Bay	6/30/2006	CLOSED	-	10	0
IM40	Kizhuyak Bay	4/30/2006	60	87	CLOSED	-
IM50	Spruce Island	CLOSED	-	-	-	-
INNER MARMOT DISTRICT TOTAL			60	87	25	0

-continued-

Table 3.–page 3 of 3

Statistical Area	Management Section	Date Closed [a]	Purse Seine GHL	Purse Seine Harvest	Gillnet GHL	Gillnet Harvest
NORTH MAINLAND DISTRICT						
NM10	Hallo Bay	CLOSED	-	-	-	-
NM20	Inner Kukak	6/30/2006	EXPLORATORY	0	EXPLORATORY	0
NM30	Outer Kukak	CLOSED	-	-	-	-
NM40	Missak Bay	CLOSED	-	-	-	-
NORTH MAINLAND DISTRICT TOTAL				0		0
MID MAINLAND DISTRICT						
MM10	Inner Katmai	6/30/2006	EXPLORATORY	0	EXPLORATORY	0
MM20	Outer Katmai	CLOSED	-	-	-	-
MM30	Alinchak	6/30/2006	EXPLORATORY	0	EXPLORATORY	0
MM40	Puale Bay	6/30/2006	EXPLORATORY	0	EXPLORATORY	0
MM50	Portage Bay	6/30/2006	EXPLORATORY	0	EXPLORATORY	0
MM60	Outer Portage	6/30/2006	EXPLORATORY	0	EXPLORATORY	0
MID MAINLAND DISTRICT TOTAL				0		0
SOUTH MAINLAND DISTRICT						
SM10	Wide Bay	6/30/2006	EXPLORATORY	0	EXPLORATORY	0
SM20	Lower Shelikof	CLOSED	-	-	-	-
SOUTH MAINLAND DISTRICT TOTAL				0		0

			Purse Seine		Gillnet	
	Total GHL All Gear	Total Catch All Gear	GHL	Harvest	GHL	Harvest
GRAND TOTAL	3,705	2,643	2,745	2,617	960	26
			% of GHL	% Harvest	% of GHL	% Harvest
			74%	99%	26%	1%

[a] Section marked 'CLOSED' did not open during the 2006 sac roe season. Sections marked 'EXPLORATORY' were open to both gear types, with no set GHL.

Table 4.–Age composition, by percent, of herring samples from the commercial sac roe fishery harvest, by section, Kodiak Management Area, 2006.

Section	Harvest (tons)	Percent at Age													
		Age-2	Age-3	Age-4	Age-5	Age-6	Age-7	Age-8	Age-9	Age-10	Age-11	Age-12	Age-13	Age-14+	n
Village Islands/Uganik Bays	1,248	0.0	13.7	18.7	12.6	14.2	23.3	5.4	8.7	1.2	0.9	0.3	0.0	0.0	821
Inner Uyak Bay	223	0.0	12.1	9.4	11.3	9.8	24.6	10.9	19.7	0.6	0.8	0.2	0.2	0.0	495
Danger Bay	181	0.0	16.5	10.4	30.3	16.8	14.3	5.2	4.1	0.5	0.5	0.5	0.5	0.0	363
East Sitkalidak Strait	225	0.0	1.6	5.6	78.3	6.9	1.6	1.4	3.7	0.0	0.2	0.2	0.0	0.0	476
Barling Bay	57	0.0	0.8	5.3	78.4	4.9	2.2	2.6	4.9	0.0	0.0	0.0	0.4	0.0	223
Outer Kiluida Bay	202	0.0	6.8	4.5	73.5	2.2	1.1	2.2	1.7	1.1	1.1	2.8	2.2	0.0	174
Inner Ugak Bay	185	0.0	2.6	7.4	6.8	20.1	1.0	1.0	0.0	5.8	11.6	28.5	13.7	1.0	189
Inner Deadman Bay	27	0.0	0.0	3.3	78.3	2.2	1.6	2.2	8.8	2.2	1.1	0.0	0.0	0.0	180
Outer Deadman Bay	79	0.2	16.2	12.5	66.5	1.7	0.0	0.2	1.4	0.5	0.0	0.2	0.0	0.0	344
North Olga Bay	48	0.0	1.6	4.1	82.9	5.3	0.8	0.8	2.4	1.6	0.0	0.0	0.0	0.0	241
Upper Olga Bay	63	0.0	0.9	4.3	85.7	5.6	0.6	0.0	0.9	1.3	0.3	0.0	0.0	0.0	302
Kizhuyak Bay	87	0.3	9.5	8.1	41.9	20.9	18.0	0.0	0.3	0.3	0.3	0.0	0.0	0.0	305
All Samples Combined [a]	2,625	0.0	10.4	12.7	31.3	12.0	15.1	4.3	6.9	1.3	1.5	2.4	1.2	0.1	4,113

[a] For 'All Samples Combined', the percent of the harvest by section is weighted to the age class data to estimate overall age composition of the purse seine harvest.

Table 5.–Average weight (g) by age class of herring samples from the commercial sac roe fishery harvest, by section, Kodiak Management Area, 2006.

	Average Weight At Age (g)													
Section	Age-2	Age-3	Age-4	Age-5	Age-6	Age-7	Age-8	Age-9	Age-10	Age-11	Age-12	Age-13	Age-14+	n
Village Islands/Uganik Bays	-	88	118	155	179	194	219	225	225	237	270	259	-	821
Inner Uyak Bay	-	88	131	172	195	208	227	238	272	264	293	269	-	495
Danger Bay	-	104	150	183	206	228	254	260	282	267	313	355	-	363
East Sitkalidak Strait	-	122	157	198	226	255	287	291	-	300	296	-	-	476
Barling Bay	-	120	150	194	221	253	279	281	-	-	-	364	-	223
Outer Kiluida Bay	-	102	146	199	245	249	278	319	346	391	347	394	-	174
Inner Ugak Bay	-	124	160	203	223	254	270	-	289	315	330	344	313	189
Inner Deadman Bay	-	-	152	201	235	228	299	288	303	353	-	-	-	180
Outer Deadman Bay	47	98	147	181	191	-	171	308	324	-	404	-	-	344
North Olga Bay	-	135	145	196	227	196	295	279	301	-	-	-	-	241
Upper Olga Bay	-	111	153	196	225	262	-	282	298	341	-	-	-	302
Kizhuyak Bay	46	95	139	187	205	222	-	332	292	280	-	-	-	305

Table 6.–Herring food and bait commercial fishery harvest, Kodiak Management Area, 1912 to 2006.

Year	Tons	Year	Tons	Year	Tons
1912	20	1944	26,835	1976	No data
1913	0	1945	31,114	1977	No data
1914	0	1946	47,506	1978	399
1915	0	1947	50,743	1979	125
1916	70	1948	46,428	1980	381
1917	138	1949	0	1981	18
1918	118	1950	44,133	1982	326
1919	260	1951	4,299	1983	33
1920	46	1952	1,389	1984	123
1921	945	1953	725	1985	102
1922	1,483	1954	0	1986	213
1923	322	1955	0	1987	217
1924	4,823	1956	13,524	1988	340
1925	9,997	1957	21,219	1989	345
1926	2,681	1958	1,711	1990	313
1927	2,593	1959	3,831	1991	215
1928	625	1960	0	1992	312
1929	No data	1961	0	1993	784
1930	622	1962	0	1994	677
1931	1,000	1963	0	1995	507
1932	3,594	1964	310	1996	651
1933	2,313	1965	35	1997	756
1934	60,000	1966	198	1998	151
1935	No data	1967	300	1999	Closed
1936	24,748	1968	15	2000	Closed
1937	27,659	1969	11	2001	115
1938	24,522	1970	8	2002	135
1939	38,601	1971	44	2003	199
1940	22,677	1972	50	2004	190
1941	40,084	1973	178	2005	168
1942	16,791	1974	40	2006	169
1943	35,352	1975	5		
AVERAGE 1912-1943	10,736	AVERAGE 1944-1975	9,208	AVERAGE 1976-2006	295

Table 7.–Subsistence herring harvest summary for the Kodiak Management Area, 1991-2006.

Year	Permits Issued	Permits Returned	Estimated Harvest in Pounds by District							
			Afognak	Northeast	Inner Marmot	Uganik	Uyak	Eastside	Alitak	Total
1991	50	9	2,110	1,745	1,745	1,000	0	0	0	6,600
1992	45	10	120	250	250	1,000	0	0	320	1,940
1993	50	16	90	3,000	3,910	550	50	0	0	7,600
1994	47	14	90	740	1,350	2,000	200	0	0	4,380
1995	20	6	75	0	500	0	340	0	175	1,090
1996	23	10	550	180	140	0	590	0	0	1,460
1997	16	7	0	200	350	50	1,325	0	0	1,925
1998	18	10	1,240	0	0	50	0	0	0	1,290
1999	15	9	0	200	350	0	425	0	0	975
2000	39	21	575	21,150	0	1,825	0	0	700	24,250
2001	48	19	3,000	0	875	0	1,015	10,500	0	15,390
2002	[a]	23	1,170	1,150	420	0	200	903	0	3,843
2003	[a]	16	0	220	300	0	420	1,210	30	2,180
2004	[a]	22	200	780	450	206	1,570	942	0	4,148
2005	[a]	37	300	995	920	160	550	2,255	155	5,335
2006	[a]	30	200	1,170	1,040	250	265	1,610	0	4,535

[a] Beginning in 2002 herring was added to the Kodiak subsistence salmon and crab permit; no separate permit was required.

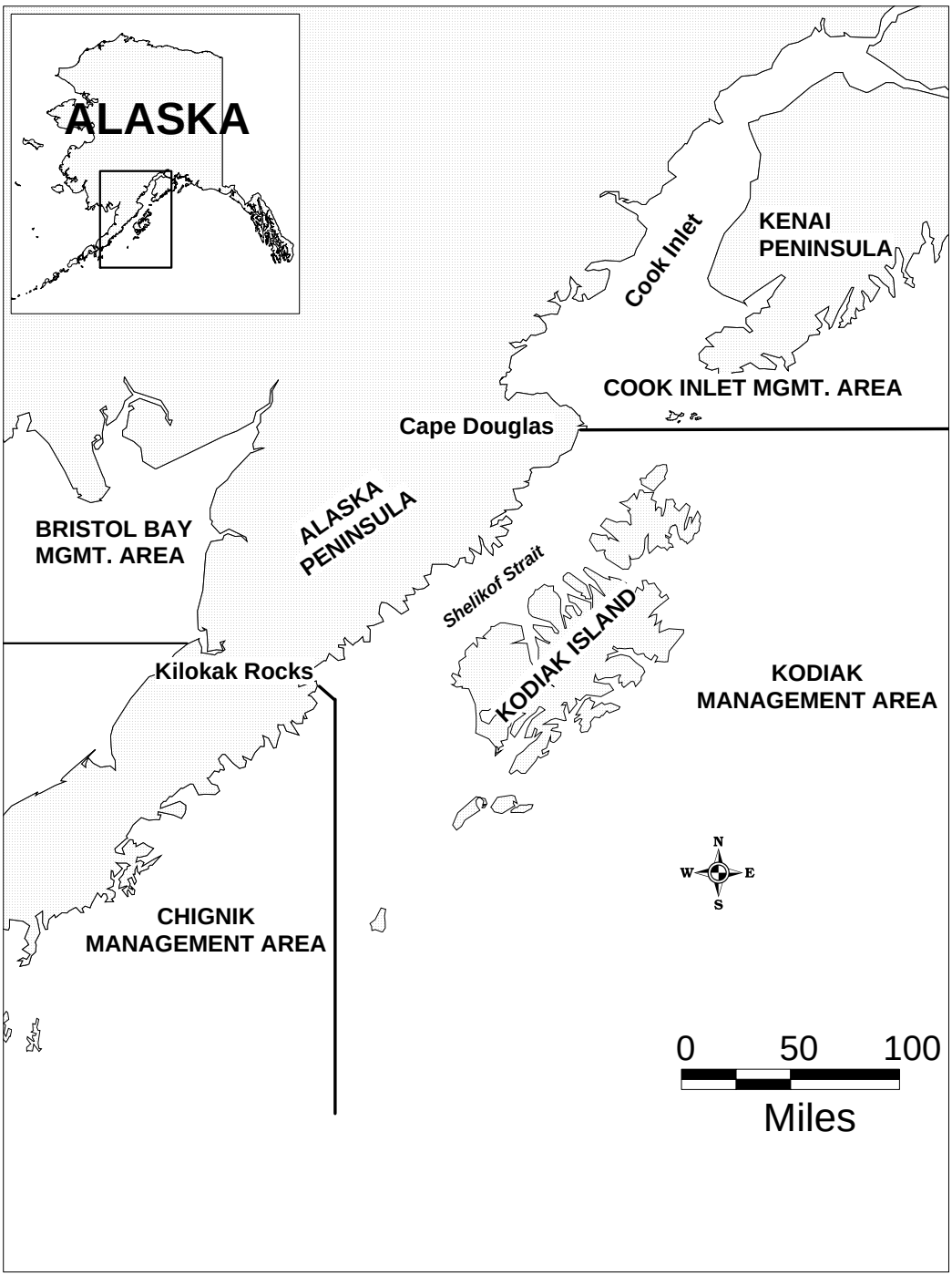


Figure 1.–Map of southwester Alaska emphasizing the Kodiak Management Area and its relationship to surrounding management areas.

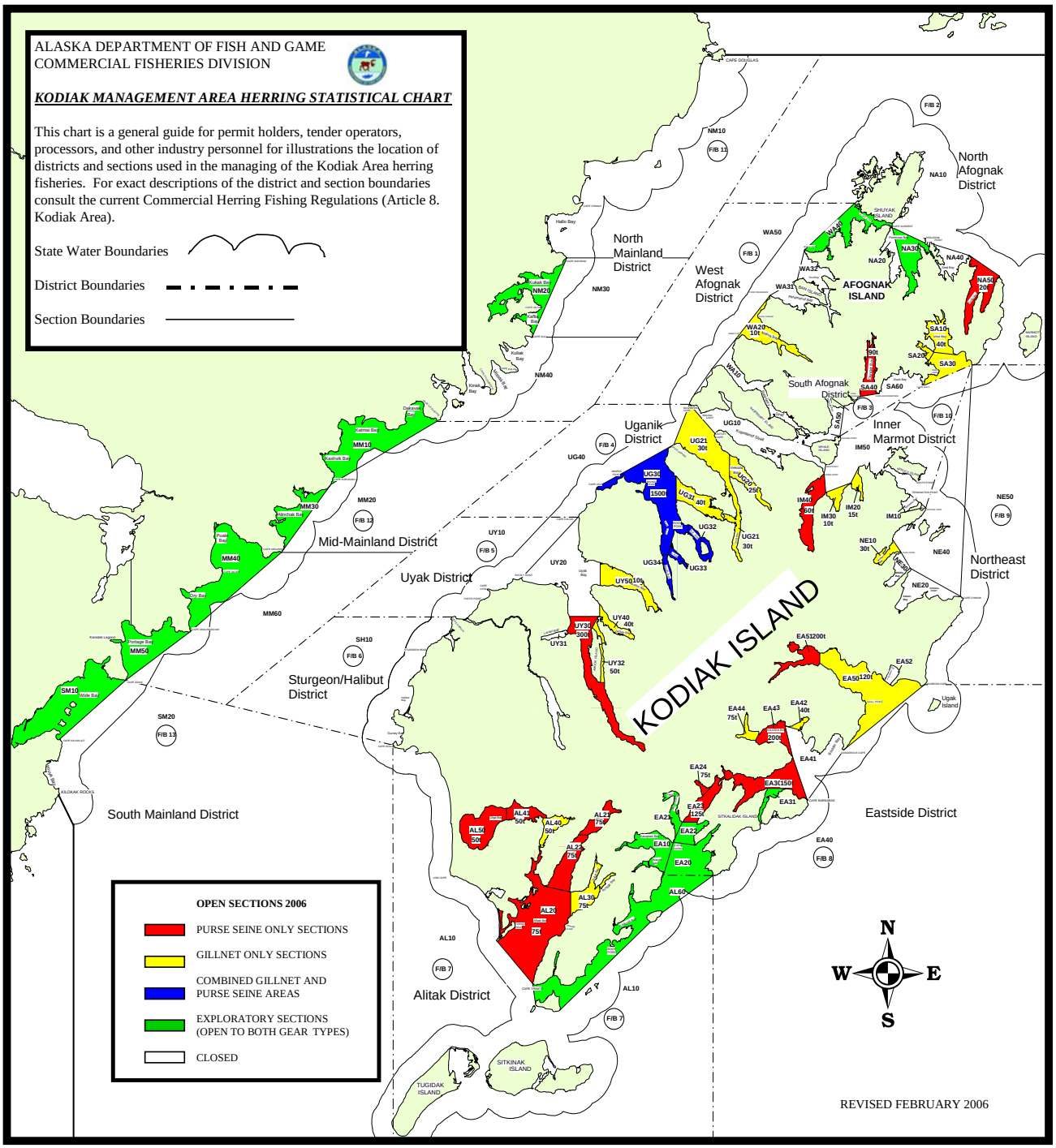


Figure 2.–Map of the Kodiak Management Area illustrating the herring commercial fishery districts.

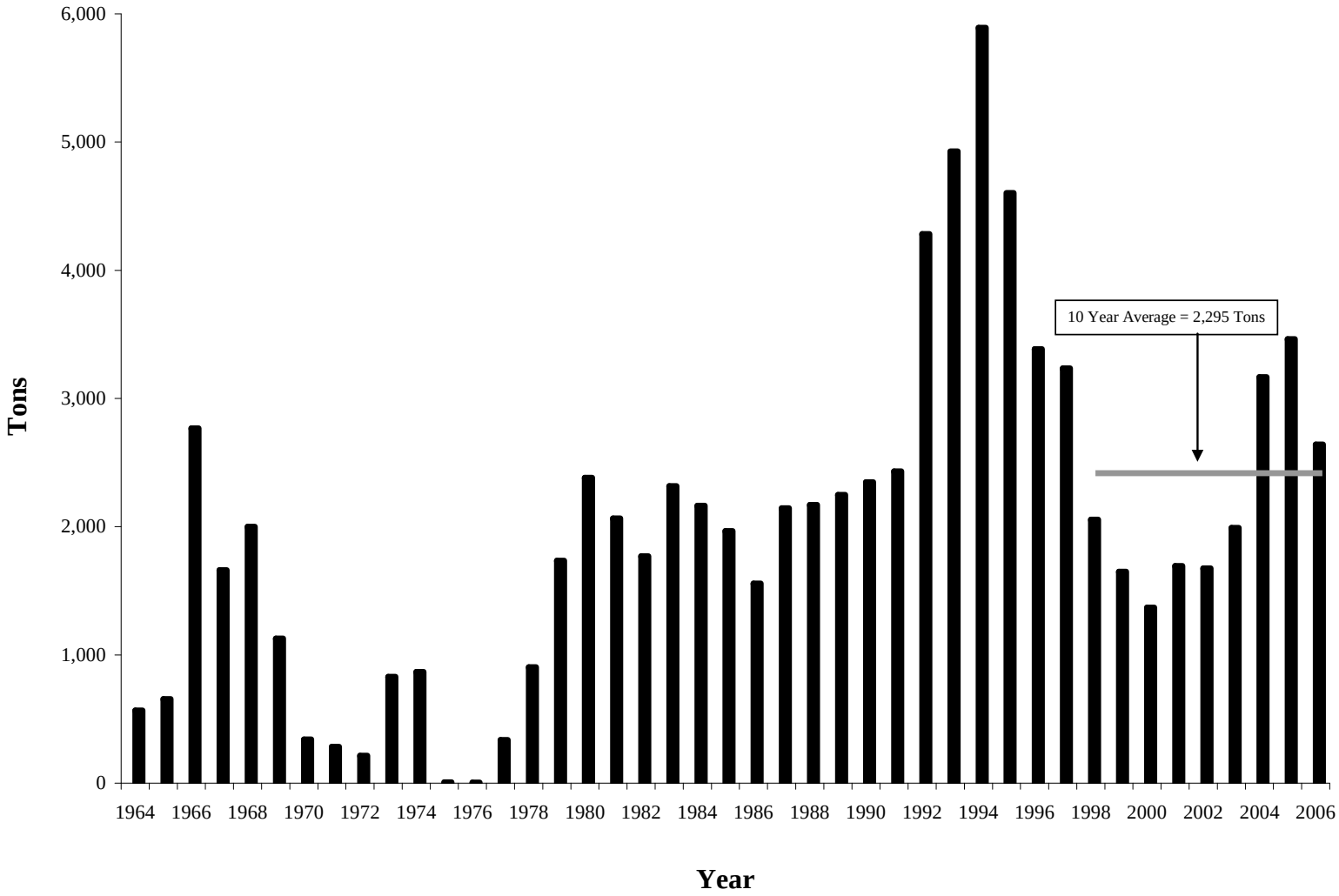
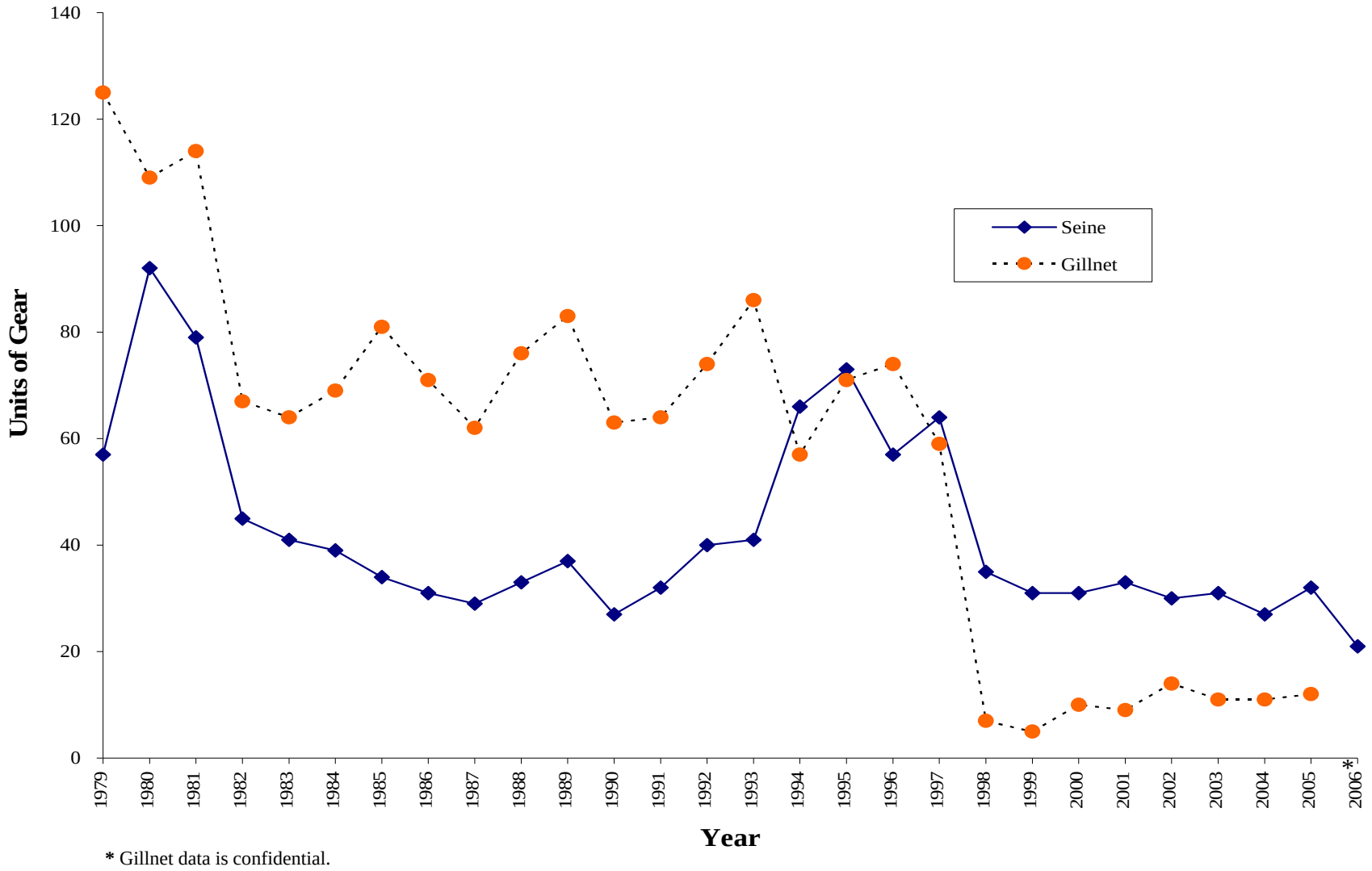


Figure 3.–Herring sac roe commercial fishery harvest, Kodiak Management Area, 1964 to 2006.



* Gillnet data is confidential.

Figure 4.–Herring sac roe commercial fishery participation (landings), Kodiak Management Area, 1979 to 2006.

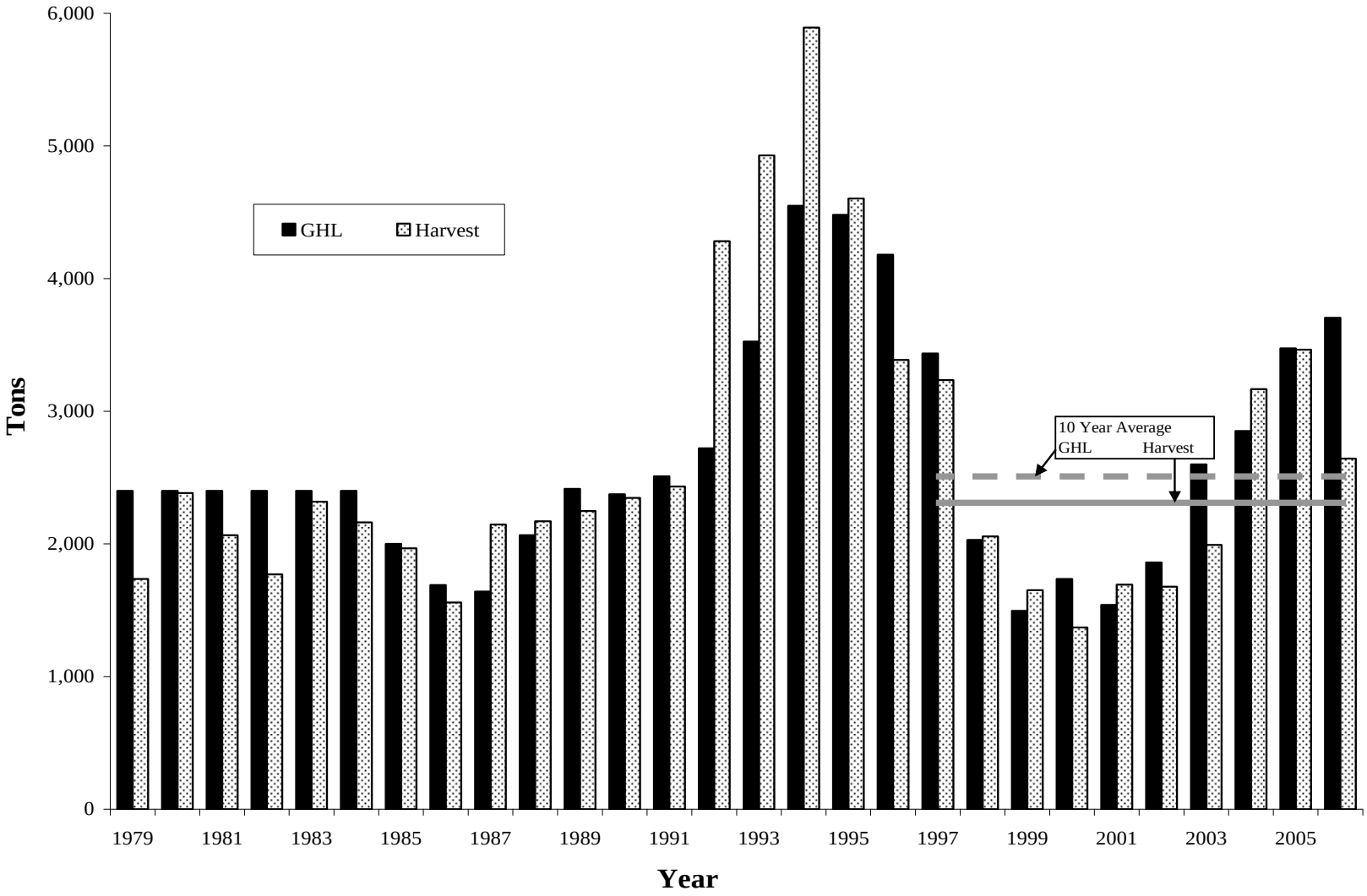


Figure 5.–Comparison of guideline harvest levels (GHLs) to the herring sac roe commercial harvest, Kodiak Management Area, 1979 to 2006.

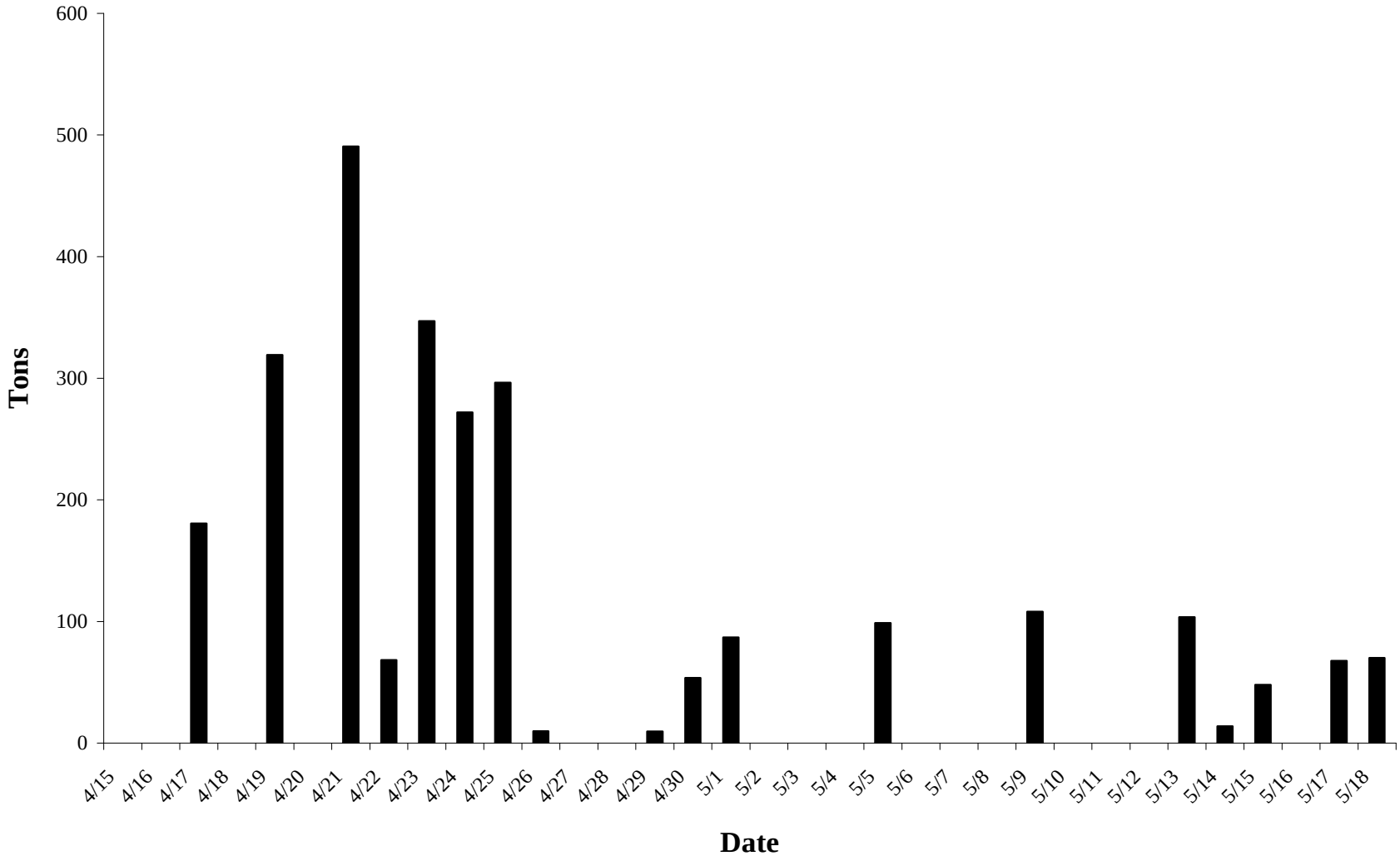


Figure 6.–Herring sac roe fishery harvest by day, Kodiak Management Area 2006.

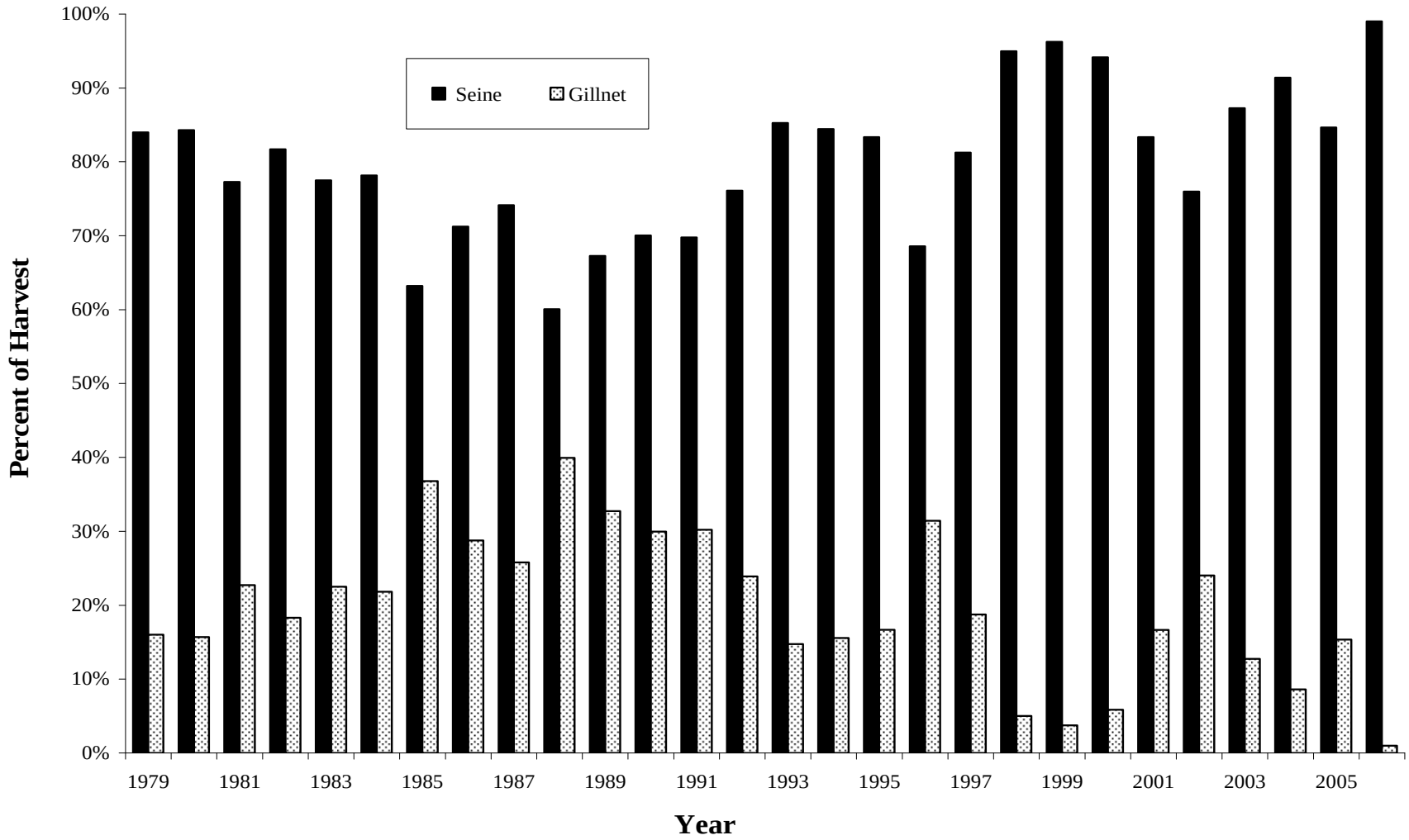


Figure 7.–Percent of the total harvest taken by gear type in herring sac roe commercial fisheries, Kodiak Management Area, 1979 to 2006.

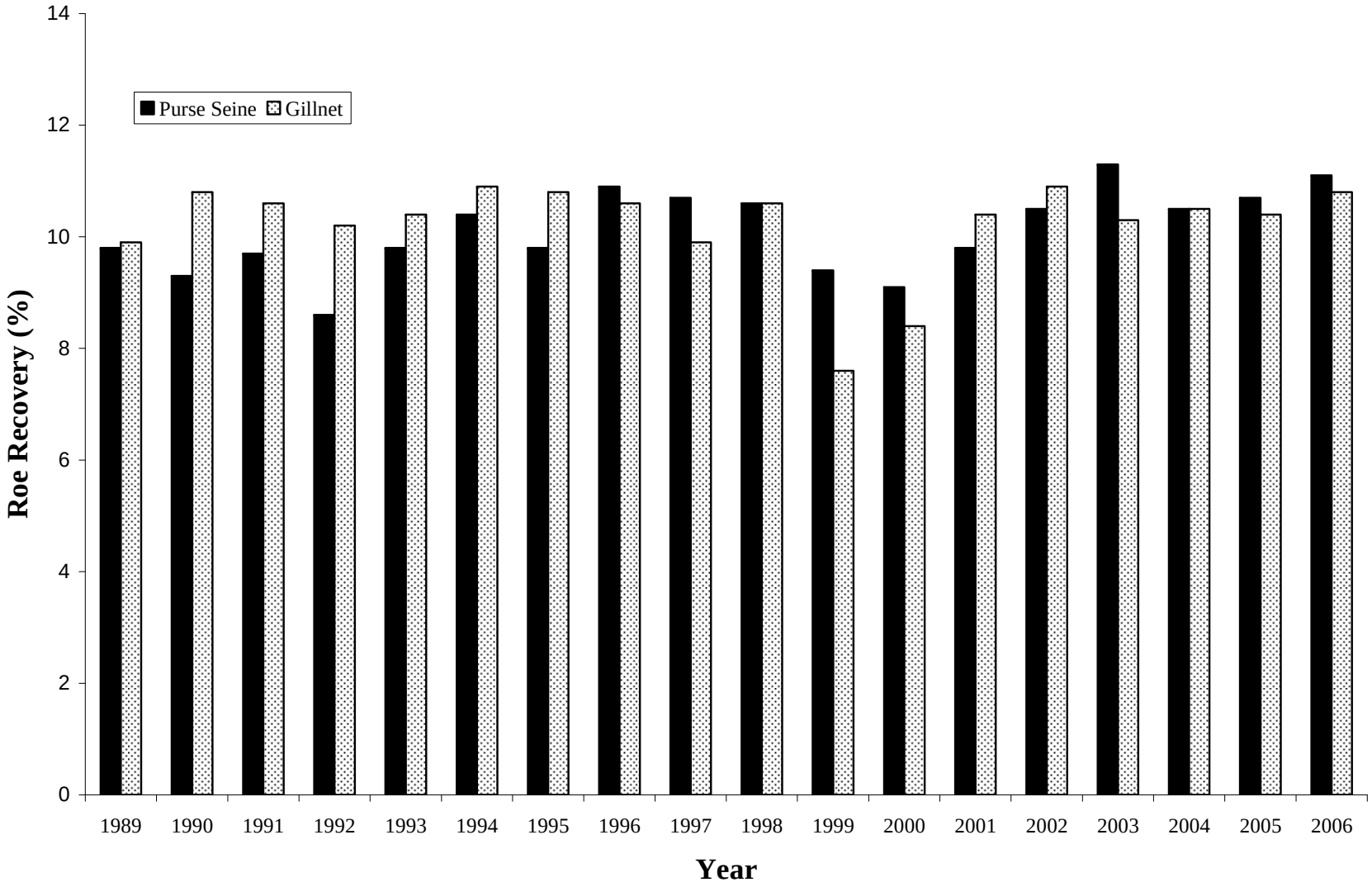
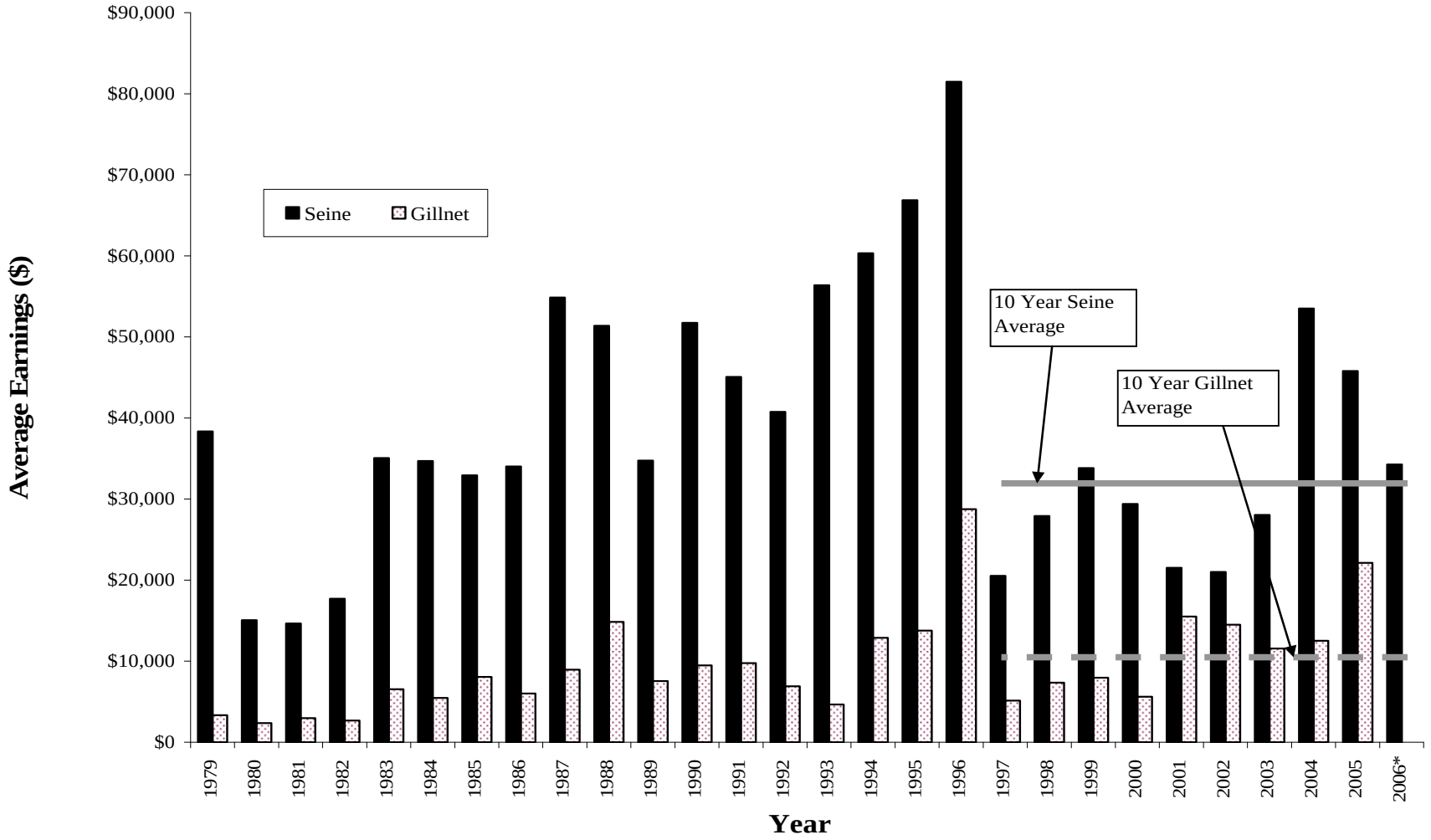


Figure 8.–Herring sac roe fishery, roe recovery, Kodiak Management Area, 1989-2006.



*Gillnet data is confidential.

Figure 9.–Average earnings by gear type for herring sac roe commercial fisheries, Kodiak Management Area, 1979 to 2006.

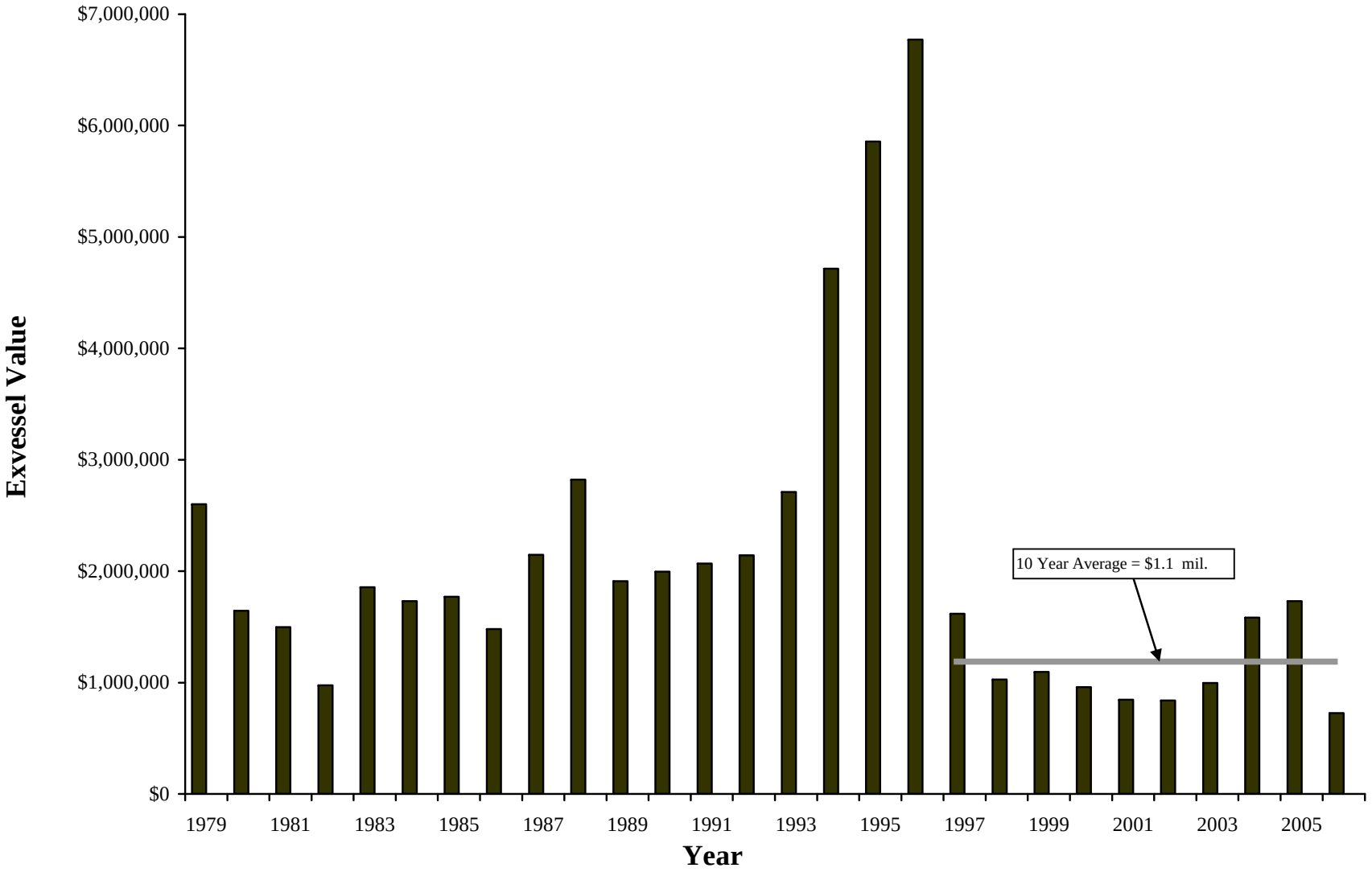


Figure 10.–Total exvessel value for herring sac roe commercial fisheries, Kodiak Management Area, 1979 to 2006.

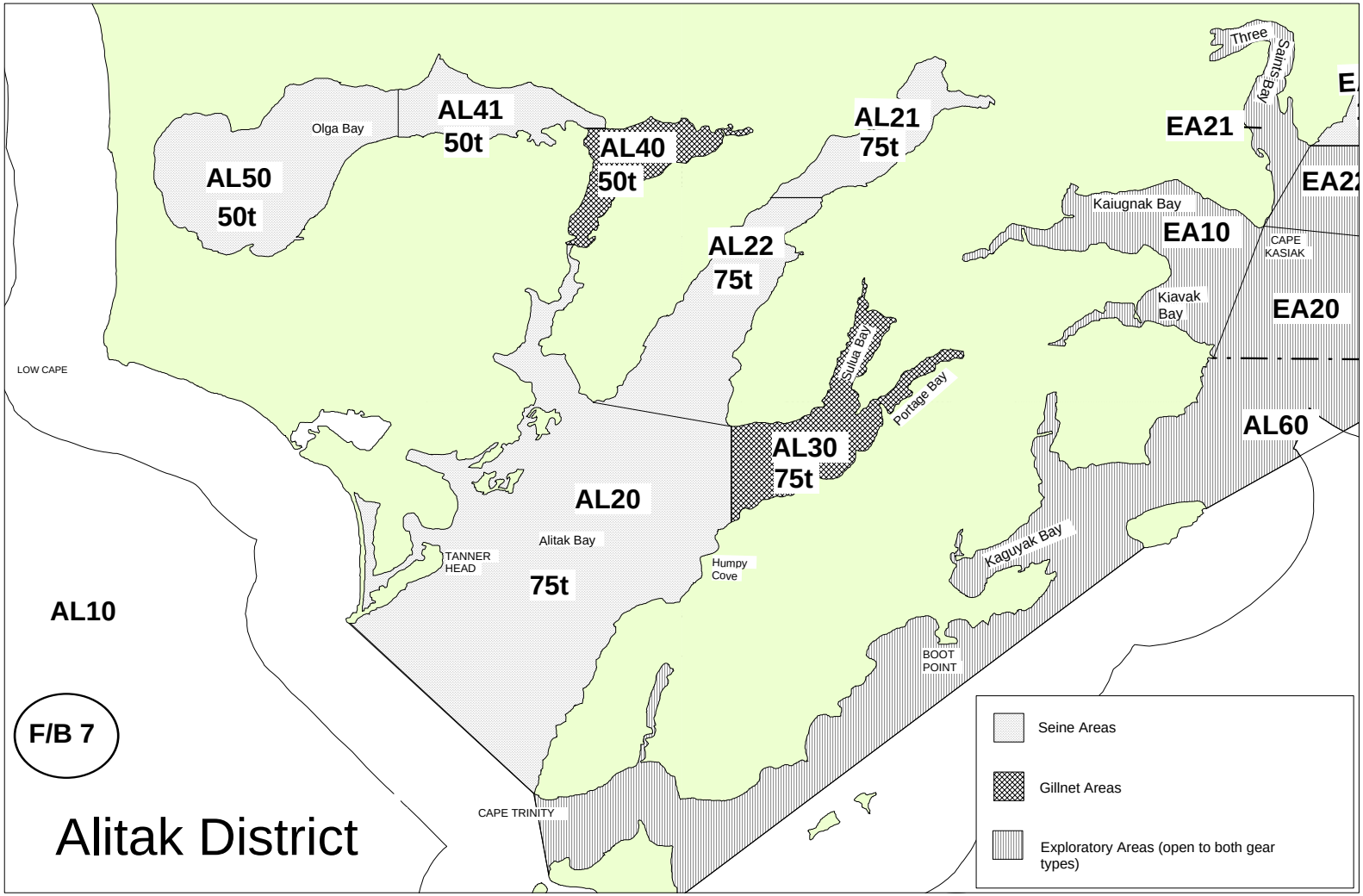


Figure 11.–Map showing the boundary lines in effect for the Alitak District in 2006.

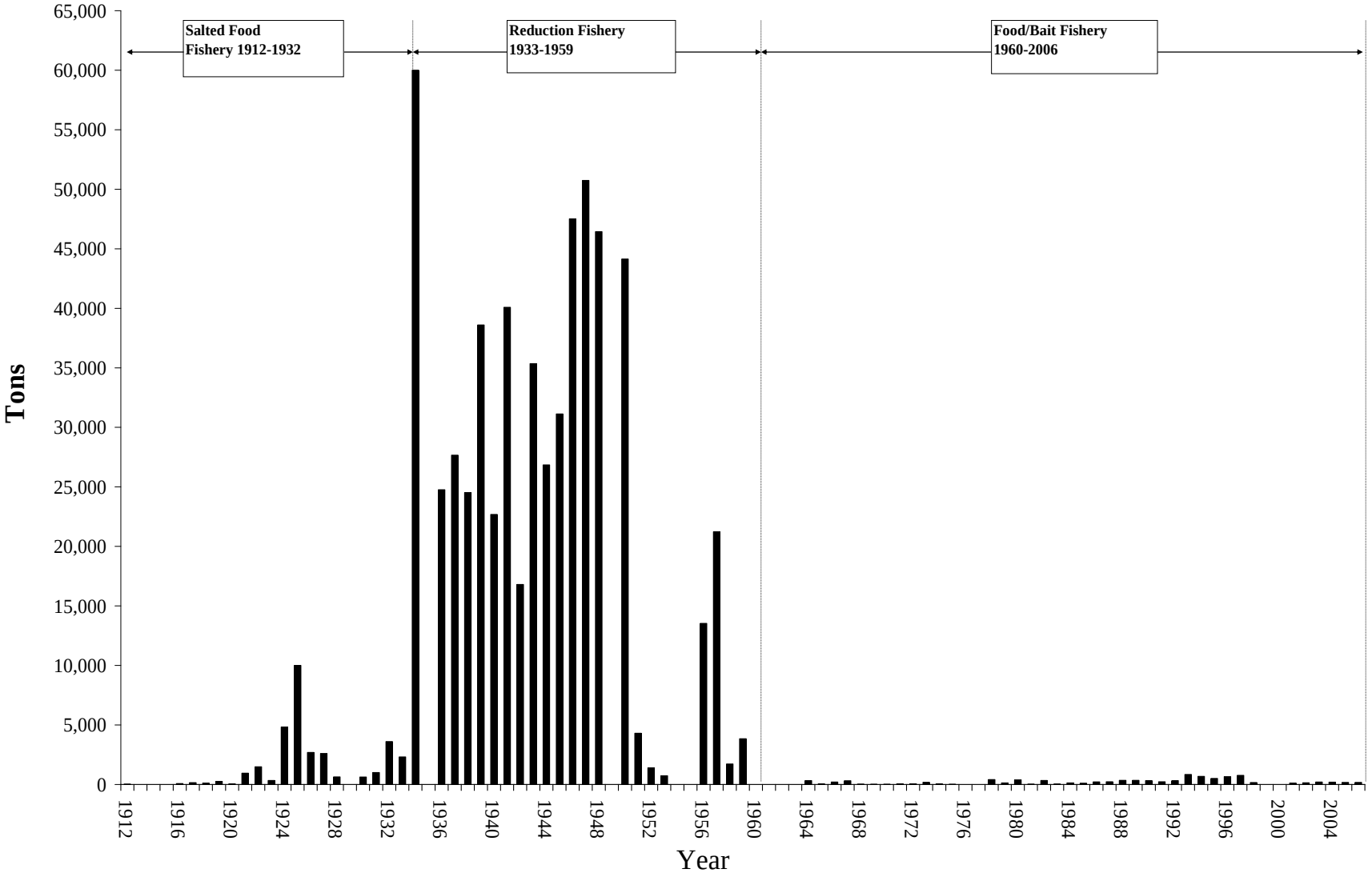


Figure 12.–Herring food and bait commercial fishery harvest, Kodiak Management Area, 1912 to 2006.

APPENDIX A: SUMMARY OF EMERGENCY ORDERS ISSUED FOR THE HERRING COMMERCIAL FISHERIES IN THE KODIAK MANAGEMENT AREA, 2006

Appendix A1.–Summary of emergency orders issued for the herring commercial fisheries in the Kodiak Management Area, 2006.

Emergency Order #	Effective:	Action Taken:
1	NOON April 15	Open Sac Roe Fishery: initial opening times and fishing periods by gear and section for sac roe herring fishery announced. This EO also modified sections and section lines in the Alitak District.
2	6:30 PM April 17	Closure: the Danger Bay Section (SA40) of the South Afognak District at 6:30 PM April 17.
3	10:46 AM April 19	Fishing Period: commercial herring fishing opened in the Inner Uyak Bay Section (UY30) from 10:46 AM to 10:56 AM April 19.
4	12:40 PM April 19	Fishing Period: commercial herring fishing opened in the Inner Uyak Bay Section (UY30) from 12:40 PM to 1:00 PM April 19.
5	3:00 PM April 19	Fishing Period: commercial herring fishing opened in the Inner Uyak Bay Section (UY30) from 3:00 PM to 3:15 PM April 19.
6	3:45 PM April 19	Fishing Period: commercial herring fishing opened in the Inner Uyak Bay Section (UY30) from 3:45 PM to 3:50 PM April 19.
7	5:00 PM April 19	Fishing Period: commercial herring fishing opened in the Inner Uyak Bay Section (UY30) from 5:00 PM to 5:08 PM April 19.
8	NOON April 20	Closure: the Barling Bay Section (EA24) of the Eastside District at NOON April 20.
9	9:15 AM April 20	Fishing Period: commercial herring fishing opened in the Inner Uyak Bay Section (UY30) from 9:15 AM to 6:17 PM April 20.

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Emergency Order #	Effective:	Action Taken:
10	9:30 AM April 21	Fishing Period: commercial herring fishing opened in the Inner Uyak Bay Section (UY30) from 9:30 AM to 9:00 PM April 21.
11	2:30 PM April 21	Fishing Period: commercial herring fishing opened for purse seine gear in the in the Village Islands/Uganik Bay Sections (UG30 and UG32-34, combined) from 2:30 PM to 9:00 PM April 21.
12	9:00 PM April 21	Closure: the East Sitkalidak Section (EA30) of the Eastside District at 9:00 PM April 21.
13	9:15 AM April 22	Fishing Period: commercial herring fishing opened in the Inner Uyak Bay Section (UY30) from 9:15 AM to 9:00 PM April 22.
14	7:30 AM April 23	Fishing Period: commercial herring fishing opened for purse seine gear in the in the Village Islands/Uganik Bay Sections (UG30 and UG32-34, combined) from 7:30 AM to 1:00 PM April 23.
15	1:00 PM April 23	Fishing Period: commercial herring fishing opened for gillnet gear in the Village Islands/Uganik Bay Sections (UG30 and UG32-34, combined) from 1:00 PM April 23 to 1:00 PM April 24.
16	2:00 PM April 24	Fishing Period: commercial herring fishing opened for purse seine gear in the Village Islands/Uganik Bay Sections (UG30 and UG32-34, combined) from 2:00 PM to 7:00 PM April 24.
17	1:00 PM April 25	Fishing Period: commercial herring fishing opened for purse seine gear in the Village Islands/Uganik Bay Sections (UG30 and UG32-34, combined) from 1:00 PM to 7:00 PM April 24.

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Emergency Order #	Effective:	Action Taken:
18	9:00 PM April 25	Fishing Period: commercial herring fishing opened for gillnet gear in the Village Islands/Uganik Bay Sections (UG30 and UG32-34, combined) at 9:00 PM April 25 until further notice.
19	9:00 PM April 30	Closure: the Kizhuyak Bay Section (IM40) of the Inner Marmot District at 9:00 PM April 30.
20	3:28 PM May 5	Closure: the Inner Kiliuda Bay Section (EA43) of the Eastside District at 3:28 PM May 5.
21	10:00 PM May 13	Closure: the Outer Ugak Bay Section (EA51) of the Eastside District at 10:00 PM May 13.
22	8:05 PM May 15	Closure: the Outer Deadman Bay Section (AL22) of the Alitak District at 8:05 PM May 15.
23	NOON May 18	Closure: the North Olga Bay Section (AL41) of the Alitak District at NOON May 18.
24	NOON May 18	Closure: the Upper Olga Bay Section (AL50) of the Alitak District at NOON May 18.
25	NOON September 22	Open Food/Bait Fishery: conditions for combine established Fishing Period: that portion of the Uganik District south of the latitude of Miners Point, the Eastside District, the Uyak District, and the Alitak District opened at NOON September 22 and remained open until the GHL was reached.
26	10:00 AM December 8	Closure Food/Bait Fishery: That portion of the Uganik District south of the latitude of Miners point.